

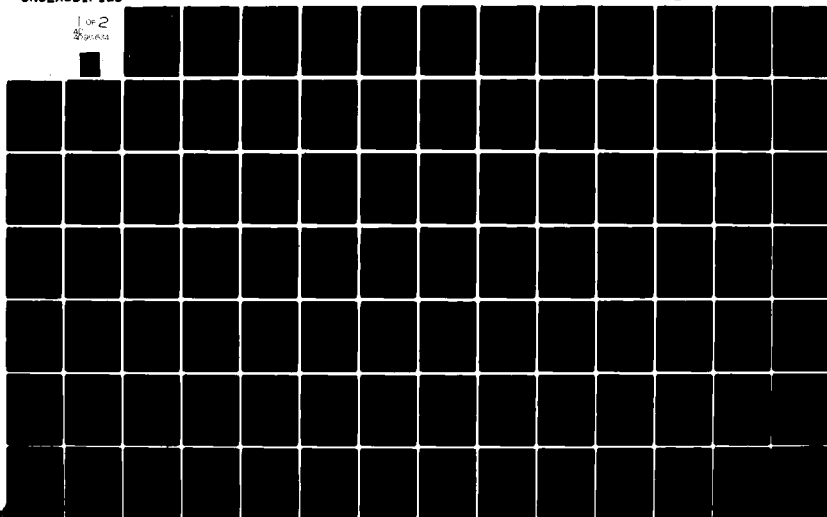
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ROCKWELL INTERNATIONAL DALLAS TEX COLLINS RADIO GROUP F/G 1/3
STRESS ANALYSIS OF AIRCRAFT MODIFICATIONS (C-141B AIRCRAFT). JO--ETC(U)
OCT 80 D B RAGAN F09603-80-C-0602

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1 of 2
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REVIS.			
LTR	DESCRIPTION	DATE	APVD

LEVEL

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STRESS ANALYSIS
OF
AIRCRAFT MODIFICATIONS
(C-141B AIRCRAFT).

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OF SHEETS

REV
SHEET

CONTRACT NO.

F09603-80-C-0602

PREP

D.B. RAGAN 10-24-80

CHK

APVD

10-27-80

ROCKWELL INTERNATIONAL CORPORATION
COLLINS RADIO GROUP

DALLAS, TEX 75207 NEWPORT BEACH, CALIF 92663 CEDAR RAPIDS IA 52406

STRESS ANALYSIS C-141B AIRCRAFT
JACC/CP PROGRAM

SIZE

A

CODE IDENT

13499

DWG NO.

649-2924-001

SCALE

SHEET 1 OF 127

METRIC

REL ☐ REV ☐ TC ☐ CR ☐ NB ☐ DL ☐

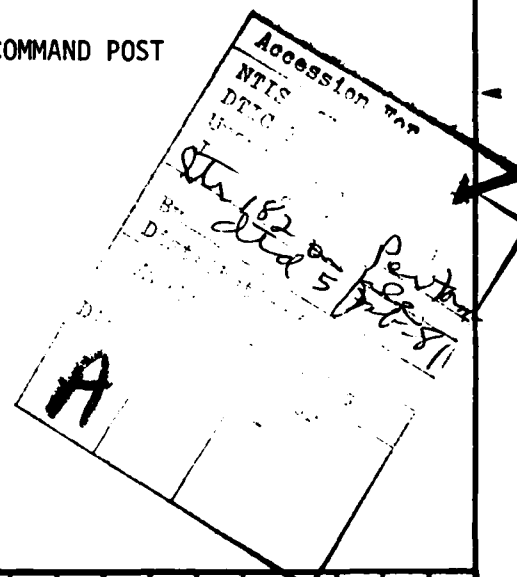
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REVISIONS			
LTR	DESCRIPTION	DATE	APVD

STRESS ANALYSIS
OF
AIRCRAFT MODIFICATIONS
(C-141B AIRCRAFT)

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REV STATUS	REV	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
OF SHEETS	SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
CONTRACT NO. F09603-80-C-0602		ROCKWELL INTERNATIONAL CORPORATION COLLINS RADIO GROUP DALLAS, TEX 75207 NEWPORT BEACH, CALIF 92663 CEDAR RAPIDS, IA 52406																							
PREP D.B. RAGAN 10-24-80		STRESS ANALYSIS C-141B AIRCRAFT																							
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APVD		SIZE		CODE IDENT		DWG NO.		<div style="display: flex; justify-content: space-between;"> A 13499 649-2924-001 </div>																	
		SCALE																							
		SHEET 1 OF 127										<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">METRIC</div> <div style="margin-left: 10px;">SI</div> </div>													

REL ☐ REV ☐ TC ☐ CR ☐ NB ☐ DL ☐ TJ ☐

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SUMMARY

Stress Analyses were performed on the following aircraft modifications:

- . AT1108 Antenna Installation,
- . HF Longwire Installation,
- . UPS-192 Antenna Installation,
- . 437S-1C Antenna Installation, *and*
- . SATCOM Antenna Installation .

The detailed conclusions of each of the topics above are contained after each sub-analysis. However, the general conclusion is that each of the subject modifications in no way impare the airworthiness of the aircraft in that the aircraft strength is equal to or greater than the original unmodified strength.

1

P 4

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 3

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REFERENCES

1. T.O. 1C-141A-3
2. MIL HDBK 5C
3. Formulas For Stress and Strain, 5th Edition, Roark & Young
4. Analysis and Design of Flight Vehicle Structures, 2nd Edition, E.F. Bruhn

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 4

↑

1.0 AT 1108 UHF/VHF/AM ANTENNA INSTALLATION
DWG. No. 649-2883-001

The antenna is mounted on top of the fuselage at F.S. 1267, LBL 6.40. The modification consist of a rectangular plate, 5.12 x 12.25 x .093 thk, attached to the original skin and a 7.29 x 6.90 x .080 thk doubler. The new rivets are NAS 1097D4. There are two .750 Dia. holes in the doubler and Filler plate.

Reference Drawings : 649-2883 Installation
 649-2880 Filler
 649-2879 Doubler

(a) Strength of original Skin Structure

skin: 7075 T6 clad .056 thk (Ref 1)

Critical Shear buckling stress of panel

$$\left. \begin{array}{l} a = 20.0 \\ b = 6 \end{array} \right\} a/b = 3.33$$

$K \approx 8.5$ (Ref 3 table 35 manner 4 b)

$$\begin{aligned} S_{cr} &= K \frac{E}{1-\mu^2} \left(\frac{t}{b} \right)^2 \\ &= 8.5 \frac{(10.3 \times 10^6)}{.89} \left(\frac{.056}{6} \right)^2 = 8559 \text{ PSI} \end{aligned}$$

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 5

Critical shear flow in panel

$$\begin{aligned} q_{cr} &= S_{cr} \cdot t \\ &= 8559 (.056) = 479 \text{ lb/in} \end{aligned}$$

(b) strength of filler plate : 2024 T3 .093 thk.

$$\left. \begin{aligned} a &= 12.25 \\ b &= 5.12 \end{aligned} \right\} a/b = 2.39$$

$$K \approx 9.5$$

$$S_{cr} = 9.5 \left(\frac{10.5 \times 10^6}{.89} \right) \left(\frac{.093}{5.12} \right)^2 = 36,978 \text{ psi}$$

Critical Shear Flow

$$q_{cr} = 36,978 (.093) = 3439 \text{ lb/in}$$

Strength of doubler : 2024 T3 .080 thk.

$$\left. \begin{aligned} a &= 7.29 \\ b &= 6.90 \end{aligned} \right\} a/b = 1.05$$

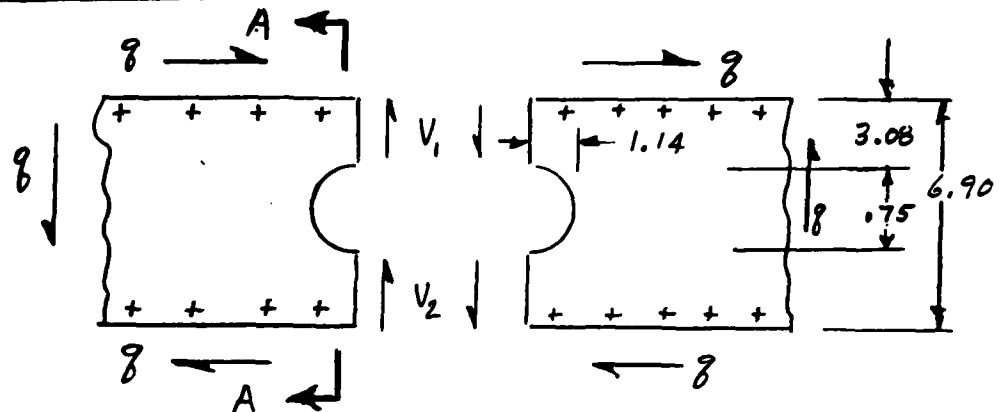
$$K \approx 12.7$$

$$S_{cr} = 12.7 \left(\frac{10.5 \times 10^6}{.89} \right) \left(\frac{.080}{6.9} \right)^2 = 20,141 \text{ psi}$$

$$q_{cr} = 20,141 (.08) = 1611 \text{ lb/in}$$

SIZE	CODE IDENT	DWG NO.
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SCALE	REV	SHEET 6

(C) Circular Cutout



Assume area between holes ineffective

$$V_1 = V_2 = \frac{1}{2} 8 (6.90) = 3.45 8$$

$$I_1 = I_2 = \frac{.229 (3.08)^3}{12} = .558 \text{ in}^4$$

$$\text{Mom } M_1 = 3.45 (479) (1.14) = 1884 \text{ in-lb}$$

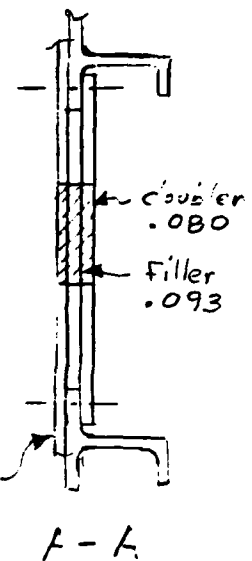
This moment is greater than actual when considering the area between the two holes will actually resist bending.

Maximum Bending Stress

$$\sigma_B = \frac{1884 (3.08)}{.558} = 10,399 \text{ psi}$$

$$\sigma_{\text{allow}} = 64 \text{ ksi } 2024 \text{ T3} \quad (\text{Ref 2})$$

$$\text{M.S.} = \frac{64000}{10,339} - 1 = \frac{5.19}{1}$$



SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET
		7

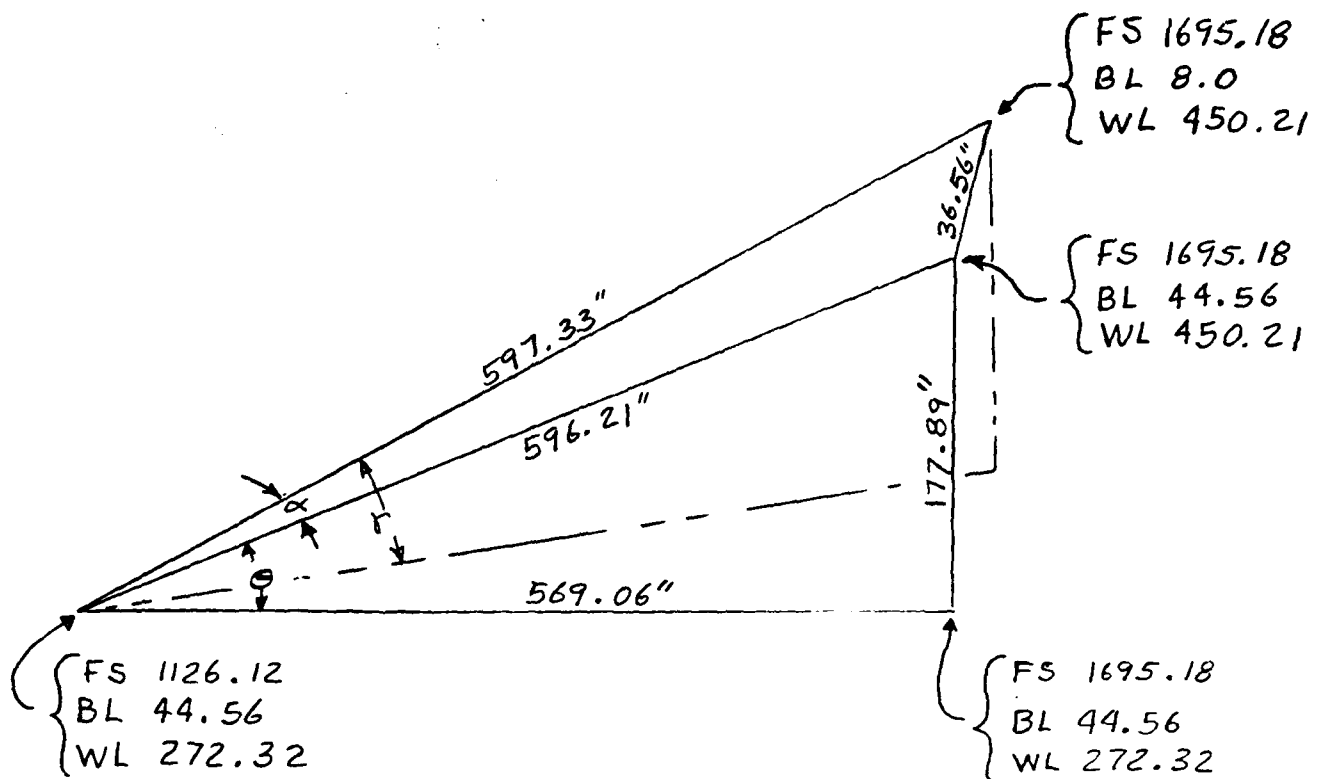
2.0 H.F. LONGWIRE INSTALLATION

Two H.F. longwire antennas are mounted on the
upperside of the aircraft at F.S. 1126, L&RBL
44.56, W.L. 272 and connected to the tail
structure (tail lifting point) at FS 1695,
L&RBL 8.0 WL 450

Reference Drawings: '649-2824 Installation

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 9

a) Geometry of installation



$$\theta = \sin^{-1} \frac{177.89}{596.21} = 17.36^\circ$$

$$\alpha = \sin^{-1} \frac{36.56}{597.33} = 3.51^\circ$$

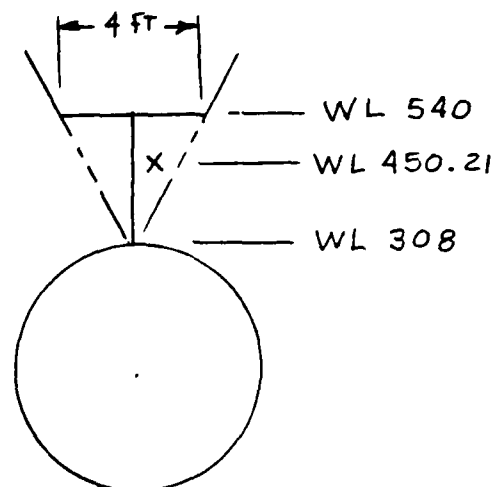
$$\gamma = \sin^{-1} \frac{177.89}{597.33} = 17.33^\circ$$

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET 10

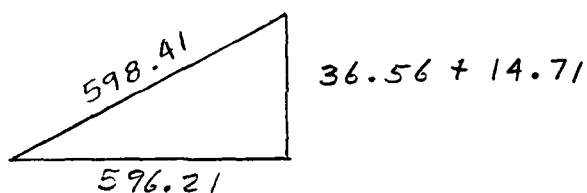
Vertical stabilizer lateral movement

$$X = \frac{24(142.21)}{232}$$

$$X = 14.71 \text{ inches}$$



Extension of antenna length



Tension takeup must move $598.41 - 597.33 = 1.08$ inches

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET 11

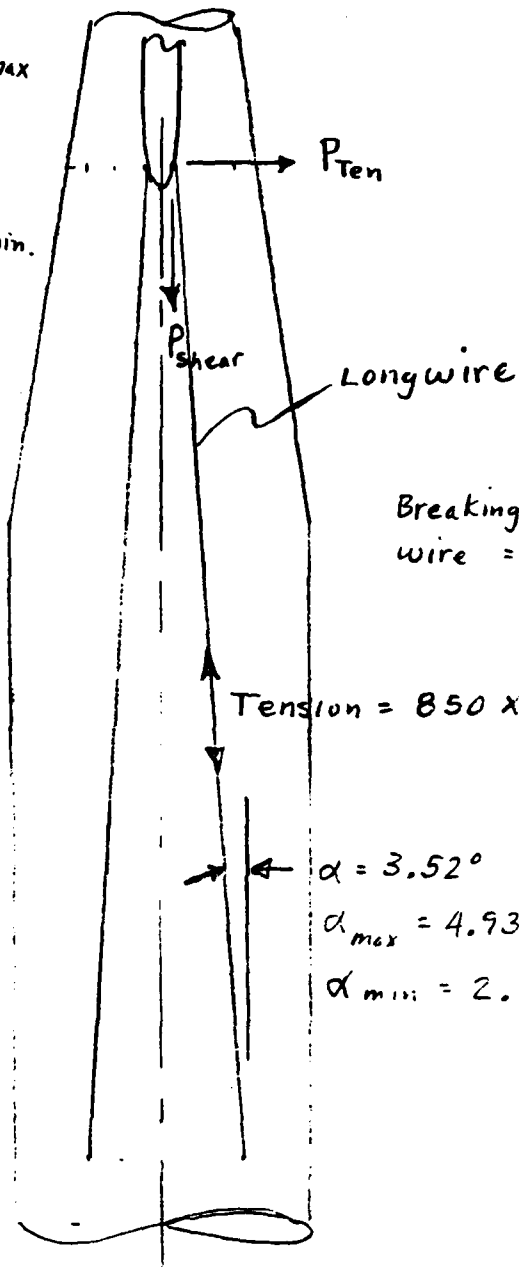
Load on tail Fitting

$$P_{Ten, max} = Tension \times \sin \alpha_{max}$$

$$= 109.57 \text{ lbs}$$

$$P_{shear max} = Tension \times \cos \alpha_{min}$$

$$= 1274 \text{ lbs}$$



Breaking Strength of
wire = 850 lbs

$$Tension = 850 \times 1\frac{1}{2} = 1275$$

$$\alpha = 3.52^\circ \text{ STATIC}$$

$$\alpha_{max} = 4.93^\circ$$

$$\alpha_{min} = 2.10^\circ$$

Plan View

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 12

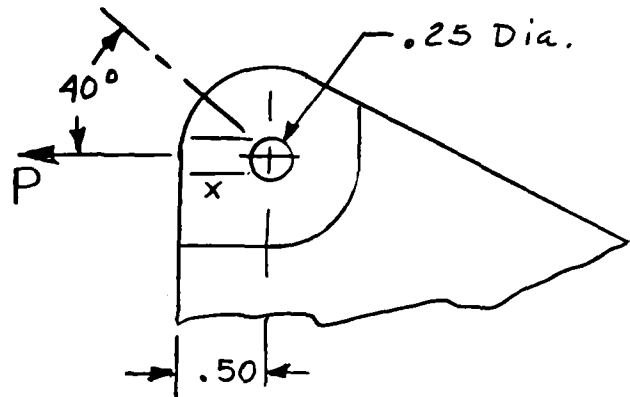
b) Tail Fitting P/N 649-2801

Mat'L. 2024-T351 QQ-A-250/4

$$F_{tu} = 62,000 \text{ psi (Ref 2)}$$

$$F_{su} = 37,000 \text{ psi}$$

$$F_{bru} = 115,000 \text{ psi (e/d=2)}$$



Bearing

Bearing Factor 2.0
Fitting Factor 1.15

$$f_{bru} = \frac{1275}{.10(.25)} = 51000 \text{ psi}$$

$$M.S. = \frac{115000}{51000(2)} - 1 \quad \quad \quad | .13$$

Shear tearout

$$f_s = \frac{1275}{2(.10)(.50 - .25 \cos 40^\circ)} = 20665 \text{ psi}$$

$$M.S. = \frac{37000}{20665(1.15)} - 1 \quad \quad \quad | .56$$

The Fitting is secured to the tail structure with
4 - NAS 517-4 bolts 160,000 PSI minimum U.T.S.
The Longwire is secured to the fitting by one
AN4 bolt. Single shear strength of 368 lbs.

SIZE	CODE IDENT	DWG NO.
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SCALE	REV	SHEET 13

Technical drawing of a fuselage section showing a rectangular cutout for a mast. The drawing includes the following labels and dimensions:

- FS1126.12**: Label at the top center.
- FWD**: Label at the top left with an arrow pointing left.
- MS24693 screw (6)**: Label at the top right pointing to a screw in the cutout.
- EXISTING STRINGER**: Label at the top right pointing to a horizontal line.
- RBL 47.093** and **LBL 42.037**: Labels on the right side pointing to horizontal lines.
- RBL 44.565** and **LBL 44.565**: Labels on the right side pointing to horizontal lines.
- AIRCRAFT SKIN**: Label on the right side pointing to the outer boundary.
- RBL 42.037** and **LBL 47.093**: Labels on the right side pointing to horizontal lines.
- EXISTING STRINGER**: Label at the bottom right pointing to a horizontal line.
- MAST**: Label at the bottom left pointing to the cutout.
- 1274***: Label in the center of the cutout with an arrow pointing to it.
- 10.5°**: Dimension at the bottom left indicating an angle.

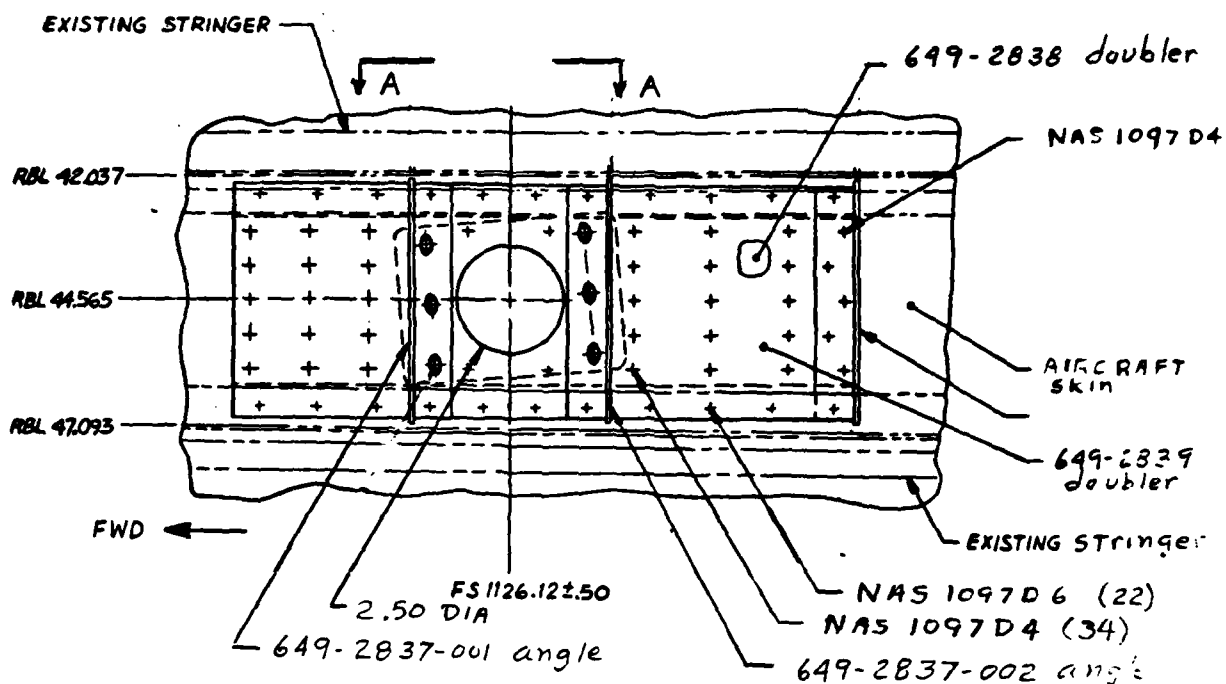
Skin : 7075-T6 clad .056 thk (Ref 1)
 $F_{tu} = 72000 \text{ psi}$ (Ref 2)

$$P = 2.5 (.056)(72000) = 10,080 \text{ lbs.}$$

Ref. drawings 649-2838 doubler
649-2839 doubler

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001	
SCALE	REV	SHEET	14

Doubler material 2024-T3 .080" thk
 $F_{tu} = 62000 \text{ psi}$ (Ref 2)



Tension load capability of doublers

$$P = [4.06 + 5.62 - 2(2.50)] (.080)(62000) = 23213 \text{ lbs}$$

$$M.S. = \frac{23213}{10,080 + 1274} - 1 \quad \quad \quad 1.04$$

Rivet capability on .056 skin

NAS 1097 D4 442 lbs } Ref 2

NAS 1097 D6 977 lbs }

$$15(442) = 6630 \text{ lbs}$$

$$8(977) = 7816 \text{ lbs}$$

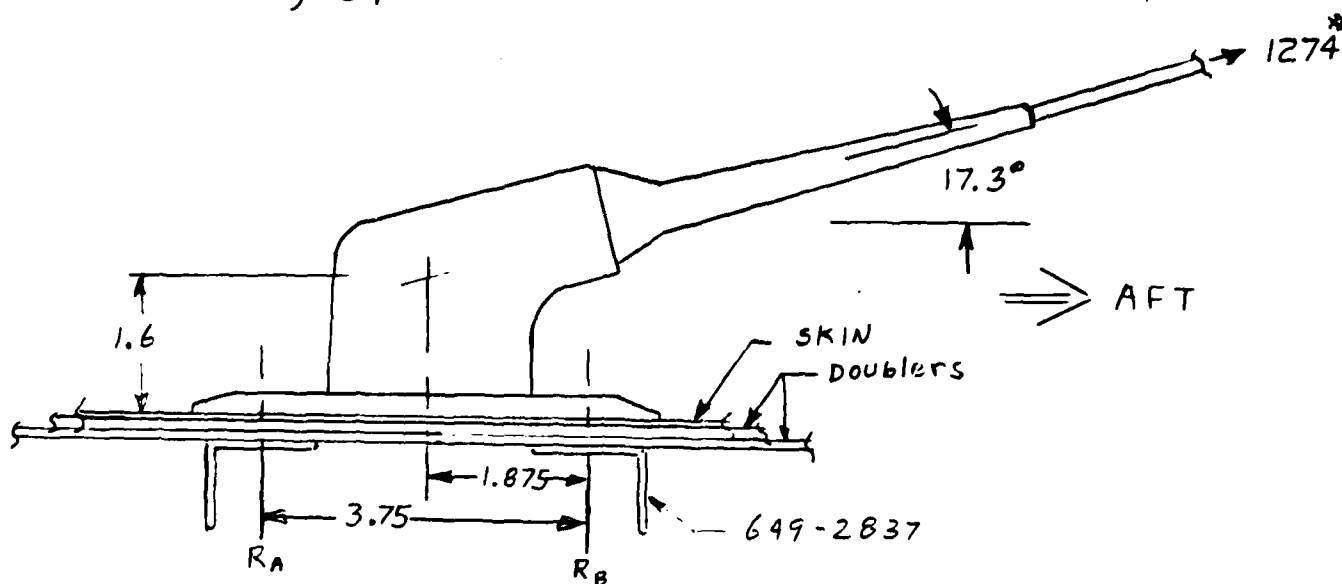
$$14446 \text{ lbs}$$

SIZE	CODE IDENT	DWG NO.
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		15

$$MS = \frac{14446}{11,354} - 1$$

rivets

.27



VIEW A-A

Shear load $1274 \cos 17.3^\circ = 1216 \text{ lbs}$

Tension load $1274 \sin 17.3^\circ = 379 \text{ lbs}$

Load on aft angle

$$\sum M_{R_F} = 1216(1.6) - 379(1.875) - 3.75 R_F = 329 \text{ lb}$$

Fwd angle

$$\sum F_V \quad 379 - 329 + R_F = 0$$

$$R_F = 50 \text{ lbs Tension or bolts}$$

$$\frac{1274}{6} = 112 \text{ lb Shear/Bolt ON MS24693}$$

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 16

Analysis of angle 649-2839

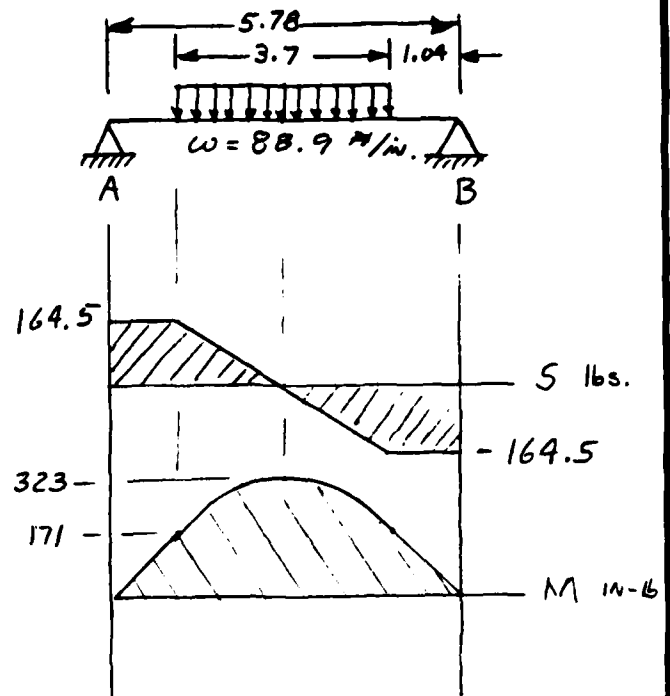
AND 10134-1204

$$I_{xx} = .0124 \text{ in}^4 \quad \bar{y} = .239 \text{ in.}$$

Bending Stress

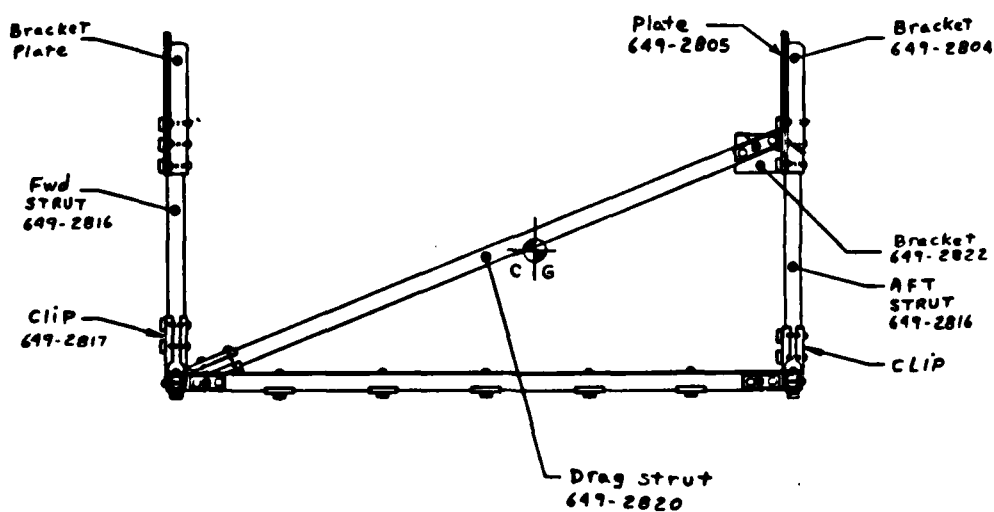
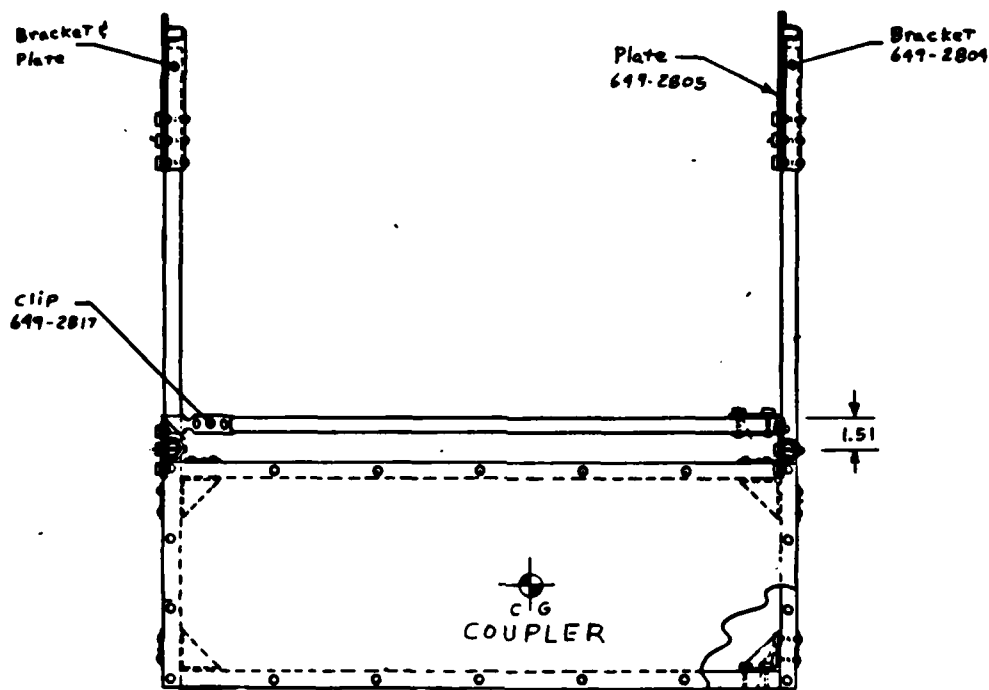
$$\sigma_B = \frac{323 (1 - .239)}{.0124}$$

$$\sigma_B = 19840 \text{ PSI} \quad \text{M.S. +}$$



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d) Coupler mount 649-2806



SIZE	CODE IDENT	DWG NO.
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		18

d.1)

Design loads per MIL-A-8865

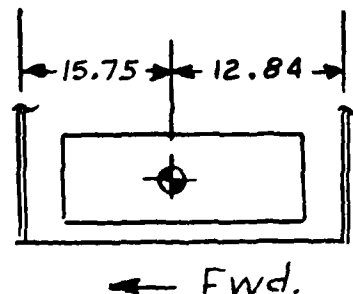
Fwd. 9.0 g

AFT. 1.5 g

Vert. 2.0 g up
4.5 g down

Lateral 1.5 g

Ultimate loads are 1.5 design



Load distribution on vertical supports

Fwd support $\frac{12.84}{28.59} V_B$

Fwd = .45 V_B

Aft = .55 V_B

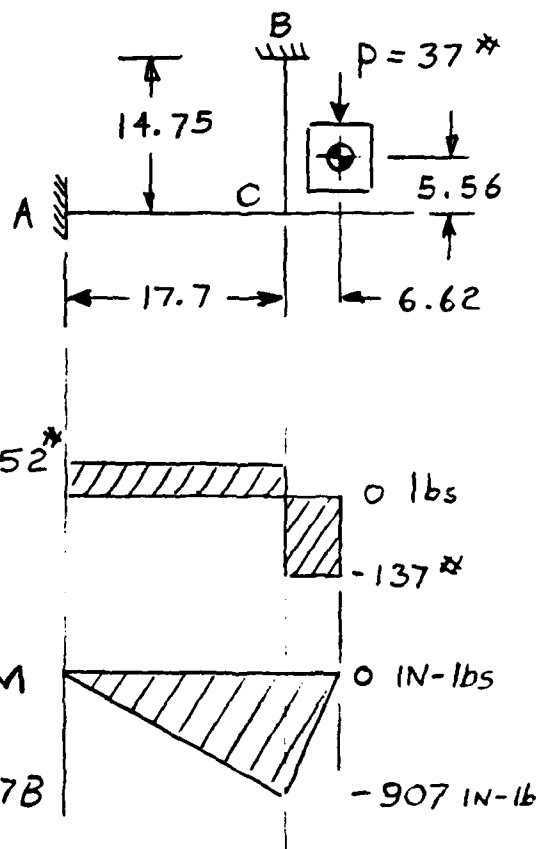
The aft vertical and horizontal strut takes the most load.

Therefore analysis will be done on aft struts.

Analysis for 6.75 g Vert. down:

$$\sum M_A = .55 (37) (24.32) (6.75) - 17.7 B$$

$B_V = 189 \text{ lbs.}$



SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 19

section property of tubular support struts

$$\text{Area} = .168 \text{ in}^2$$

$$I = .00958 \text{ in}^4$$

Stress at Joint C on horizontal strut

$$\sigma_b = \frac{907 (.375)}{.00958} = 35,501 \text{ psi}$$

MatL properties 2024 T3 tubing

$$F_{tu} = 64,000 \text{ psi} \quad (\text{Ref 2})$$

$$F_{su} = 39,000 \text{ psi}$$

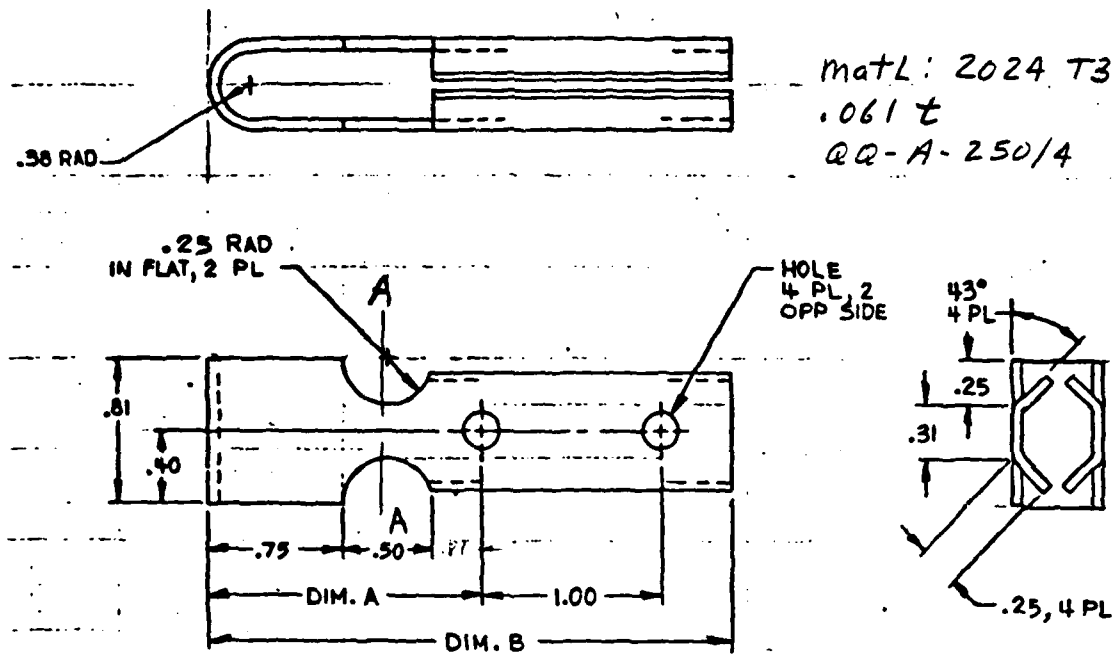
$$MS = \frac{64000}{35501} - 1 \quad \text{Bending} \quad \frac{.80}{.80}$$

$$\tau = \frac{189}{.168} = 1125 \text{ psi}$$

$$MS = \frac{39000}{1125} - 1 \quad \text{shear} \quad \frac{33.7}{33.7}$$

SIZE	CODE IDENT	DWG NO.
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SCALE	REV	SHEET
		20

d.2)
Clip 649-2817



$$F_{tu} = 64 \text{ KSI} \quad (\text{REF 2})$$

$$F_{bru} = 104 \text{ KSI} (e/d = 1.5)$$

Tension across section A-A

$$A_{reu} = 2 (.31) (.061) = .038 \text{ IN}^2$$

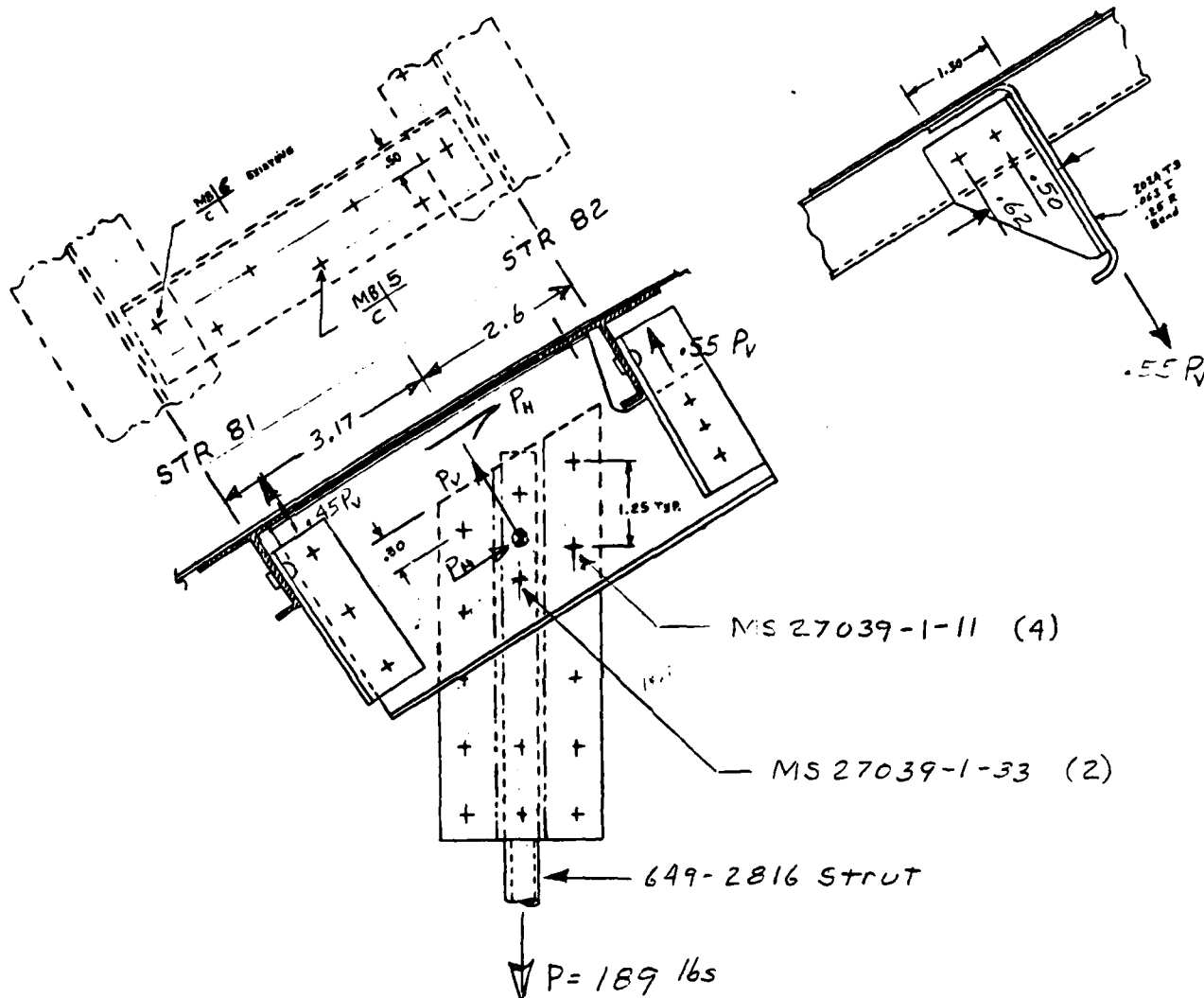
$$P = 189 \text{ lbs} (1.15) \text{ fitting factor} = 217 \text{ lbs}$$

$$\sigma_T = \frac{217}{.038} = 5720 \text{ PSI} \quad MS = +$$

$$\sigma_{Br} = \frac{217}{4 (.187) (.061)} = 4756 \text{ PSI} \quad MS = +$$

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 21

d.3) Load in aft Vertical strut & rivet pattern



MS 27039-1 Screw Ten. allowable = 2500 lbs
 Shear = 2125 lbs Single Screw
 2024 T3 bearing Allow = 104 Ksi ($e/d = 1.5$)

M.S. +

SIZE	CODE IDENT	DWG NO.
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$$P_v = 189 \cos 31^\circ = 162 \text{ lbs}$$

A right-angled triangle representing force components. The hypotenuse is labeled $P = 189 \text{ \#}$. The angle between the hypotenuse and the vertical side is labeled $\theta = 31^\circ$. The horizontal side is labeled P_H and the vertical side is labeled P_V .

$$\text{Load per rivet} = \frac{97}{7} = 14 \text{ lbs} \quad \text{M.S. +}$$

$$162 \left(\frac{3.17}{5.77} \right) (1.15 \text{ fitting factor}) = 102 \text{ lbs}$$

→ | .62 | .50 | ←

A  B

↓
102 16s

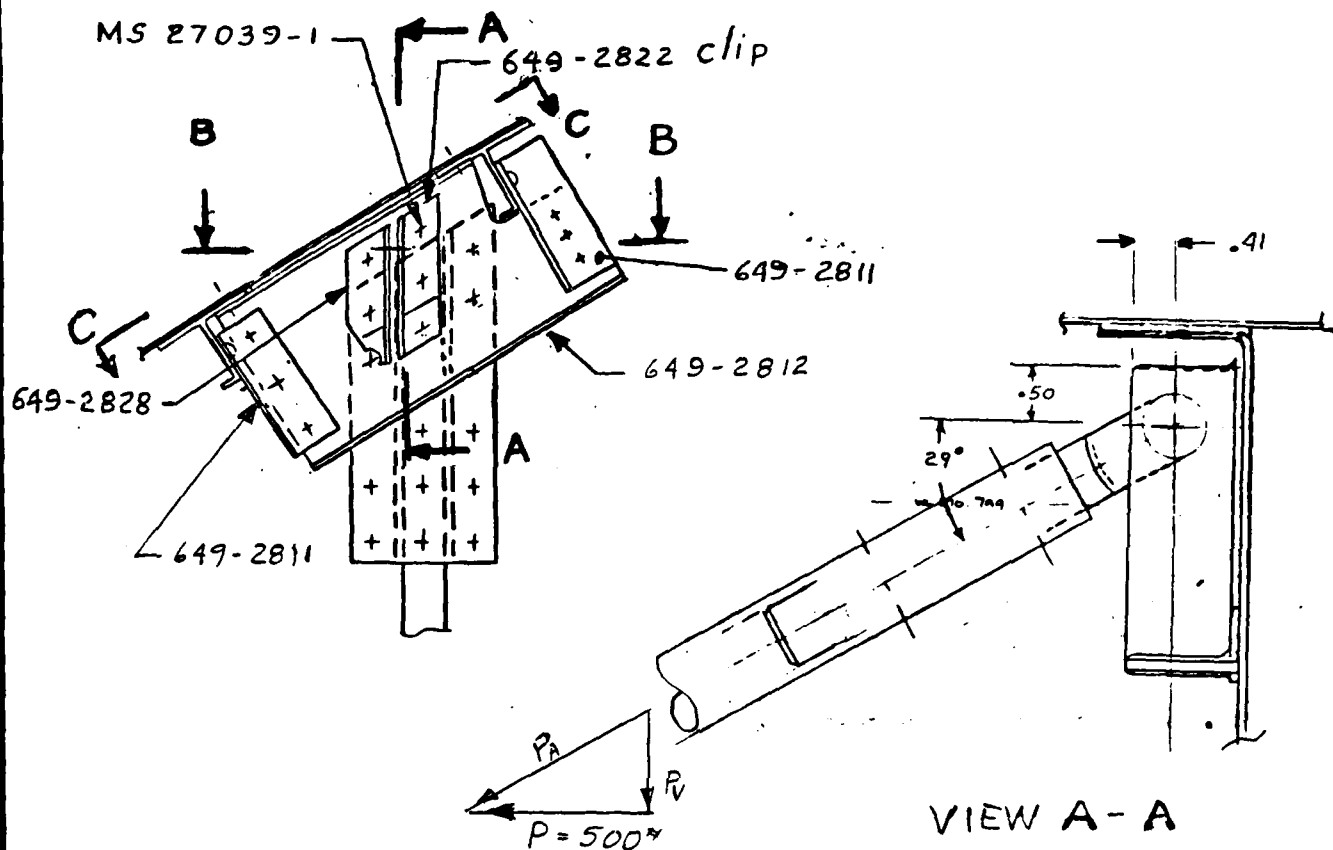
$$\text{Axial load} = \frac{102}{2} = 51 \text{ lbs}$$

Shear strength of MS 20470AD4 into .063 mat'L.
is 388 lbs (ref 2)

$$M.S. = \frac{338}{184} - 1 \quad \text{---} \quad \text{---} \quad \text{---} \quad \left| .84 \right.$$

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 23

d.4) ANALYSIS OF DRAG BRACE SYSTEM



$$\text{Fwd load} = 37^{\#} (9g)(1.5) = 500 \text{ lbs}$$

AXIAL LOAD IN DRAG BRACE

$$P_A = \frac{500}{\cos 29^\circ} = 572 \text{ lbs}$$

$$\sigma_T = \frac{572}{.168} = 3403 \text{ psi} \quad \text{M.S. +}$$

$$P_V = 500 \tan 29^\circ = 277 \text{ lbs}$$

$$P_V = \frac{277}{5} = 55 \text{ lb/bolt} \quad \text{MS +}$$

SIZE	CODE IDENT	DWG NO.
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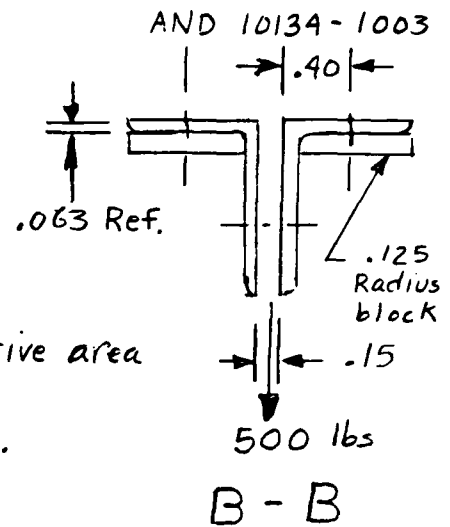
Analysis of angle clip 649-2822 & 649-2828

Assume all 500 lb load goes into the top two MS27039-1 fasteners.

Assume a section .38 inches wide on each side of fastener resists load

$$I = \frac{.75 (.187)^3}{12} = 4.09 \times 10^{-4} \text{ effective area}$$

$$\sigma_B = \frac{250 (.40) (.093)}{4.09 \times 10^{-4}} = 22,755 \text{ psi}$$



Mat'l Strength for 2024-T3511 extrusion

$$F_{tu} = 54000 \text{ psi LT (Ref 2)}$$

$$F_{su} = 29000 \text{ psi}$$

$$F_{bru} = 108000 \text{ psi (e/D = 2)}$$

$$MS = \frac{54000}{22755} - 1 \quad \text{Bending} \quad 1.37$$

Clip Shear at heel

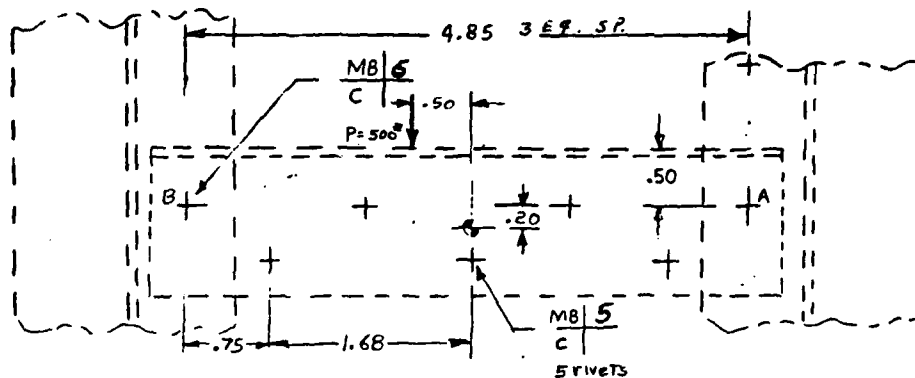
$$\tau = \frac{250}{.063 (.40)} = 4960 \text{ psi MS +}$$

Bearing from 500# load

$$\sigma_{Br} = \frac{250}{(.187) (.063)} = 21,221 \text{ psi MS +}$$

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET
		25

Fore - Aft Drag load is carried into top skin
by 2 ~ NAS 1097D6 rivets and 5 ~ NAS 1097D5 rivets



VIEW C - C

Torsional shear stress on rivets A & B

$$\tau_t = \frac{500(.50)(2.42)}{2[(2.43)(.028) + (1.702)(.019) + (.833)(.019)] + .3(.019)}$$

$$= \frac{605}{.236} = 2561 \text{ psi}$$

Axial shear stress :

$$\tau_a = \frac{500}{2(.028) + 5(.019)} = 3311 \text{ psi}$$

Total shear stress on rivet B :

$$\tau_{tot} = 2561 + 3311 = 5872 \text{ psi} \quad \text{M.S. +}$$

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 26

The vertical load produced by the drag load is carried by the 649-2812 channel to the aircraft stringers thru the 649-2811 clips. the clips are secured to the stringers by 2 ~ MS20470AD4 rivets.

Vertical load to stringers

$$V = 277 \cos 31^\circ = 237 \text{ lbs}$$

Shear load to skin

$$H = 277 \sin 31^\circ = 143 \text{ lbs}$$

Stringer #82 has the greater load due to forward g loading.

$$\text{Vertical load str \#2} = .59 (237) = 140 \text{ lbs}$$

Excentric load on rivets

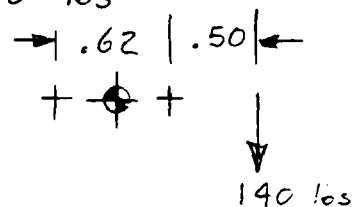
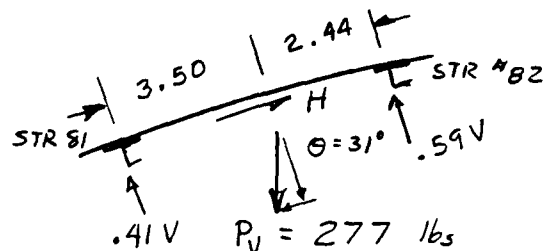
$$P = \frac{.81 (140) (.31)}{2 (.31)^2} = 183 \text{ lbs}$$

$$\text{Axial load} = \frac{140}{2} = 70 \text{ lbs}$$

$$\text{Resultant maximum load} = 253 \text{ lbs}$$

Shear strength of MS20470AD4 into .063 mat - is 388 lbs (Ref 2)

$$M.S. = \frac{388}{253} - 1 \quad \text{-----} \quad .53$$



SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 27

the H component of the vertical load is 143 lbs which is sheared into the skin by 7 rivets

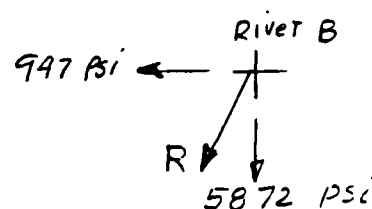
$$\text{Stress on rivets} = \frac{143}{2(.028) + 5(.019)} = 947 \text{ psi}$$

$$\text{Load on Rivet B} = 947 (.028) = 26.5 \text{ lbs}$$

The resultant stress on rivet B (max. stressed rivet)

$$\text{is } \sqrt{(5872 \text{ psi})^2 + (947 \text{ psi})^2}$$

$$R = 5948 \text{ psi}$$



Allowable shear stress on 2017-T31

(D) rivet is 34000 psi (Ref 2)

$$\text{M.S.} = \frac{34000}{5948} - 1 \quad \quad \quad \frac{4.72}{\quad}$$

(e) SUMMARY

The analysis shows that the design is of sufficient strength to carry all induced loads with the following minimum Margins - of - Safety

Tension	M.S. = 0.80	(P. 20)
Bearing	M.S. = 0.13	(P. 13)
Rivet attachment	M.S. = 0.27	(P. 16)

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 28

3.0 UPS-192 H.F. RECEIVE ANTENNA INSTL DWG. NO. 649-2797-001

The antenna is mounted on the bottom of the fuselage at F.S. 846, LBL 2.95. The modification consist of a doubler 4.25" x 8.00" x .080 thk. attached to the inside of the fuselage skin by 34 NAS 1097 D5 rivets. There is one .906 diameter hole drilled in the center of the doubler

Reference Drawings

649-2797 Installation
649-2796 Doubler

(a) Consider Compression load in bottom skin

Load lost by cutout in skin

skin is 7079 T6 clad .071 thk (Ref 1)

$F_{cy} = 62,000 \text{ psi}$ (Ref 2)

$$P_{lost} = 62000 (.071) (.903 + .218 + .218)$$

$$P_{lost} = 5894 \text{ lbs}$$

Load capability of doubler

matl 2024 T3 .080 thk.

$F_{cy} = 39000 \text{ psi}$

$$P_{capability} = 39000 (4.08_{eff} - 1.339) (.080) = 8552 \text{ lbs}$$

$$M.S. = \frac{8552}{5894} - 1$$

.45

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 29

(b) Buckling of Sheet

critical buckling stress of original aircraft panel

$$\sigma_{cr} = \frac{\pi^2 k_c E}{12(1-\mu^2)} \left(\frac{t}{b}\right)^2$$

$$\text{for } \frac{b}{t} = \frac{5.1}{.071} = 72$$

$$k_c = 5.5$$

(Ref 4 P. C5.3)

$$\sigma_{cr} = 10,330 \text{ psi}$$

critical buckling of doubler

$$b_w = 4.24 - .08 = 4.16$$

$$b_f = .75 - .04 = .71$$

$$\frac{b_f}{b_w} = .17$$

$$\frac{t_w}{t_f} = 1.0$$

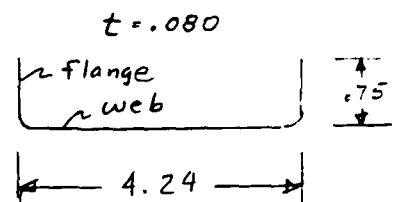
$$k_w = 4.6 \quad (\text{Ref 4 P. C6.3})$$

$$\sigma_{cr} = \frac{k_w \pi^2 E}{12(1-\mu^2)} \left(\frac{t_w}{b_w}\right)^2 = 16,801 \text{ psi in web}$$

Compressive load on doubler

$$P_c = \frac{5894}{.446} = 13203 \text{ psi}$$

$$M.S. = \frac{16801}{13203} - 1 \quad \quad \quad .27$$



SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET
		30

4.0 4375-1C VHF/FM ANTENNA INSTALLATION

Two VHF/FM Antennas are mounted on the underside of the aircraft at F.S. 529.00 E L & R BL 48.5. A third antenna is mounted atop the Inflight Refueling housing at F.S. 507 &

Reference Drawings :

649-2884	Installation
649-2900	Installation
649-2898	Doubler

(a) 649-2900 Installation

The two lower antennas are in line with the flight of the aircraft and have a maximum drag of 2.55 lbs at 510 mph 30,000 ft altitude.

During take off and landing the antennas experience a side load due to the angle of attack with the airstream.

The cross sectional area of the antenna is 168 in² (1.17 ft²)

Assume maximum angle of attack of 14° during take off rotation at M = 0.48

The antenna blade will be treated as a Flat Plate for side load analysis

Dynamic pressure at sea level

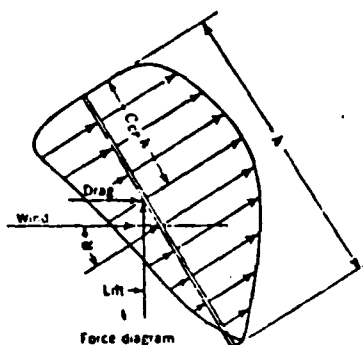
$$C = 1118 \text{ FPS}$$

$$P = .002378 \text{ lb sec}^2/\text{ft}^2$$

$$V = 200(1.688) = 338 \text{ FT/sec}$$

$$B = \frac{1}{2}(.002378)(338)^2 = 135.51 \text{ lb/ft}^2$$

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 32



(d) INCLINED PLATE

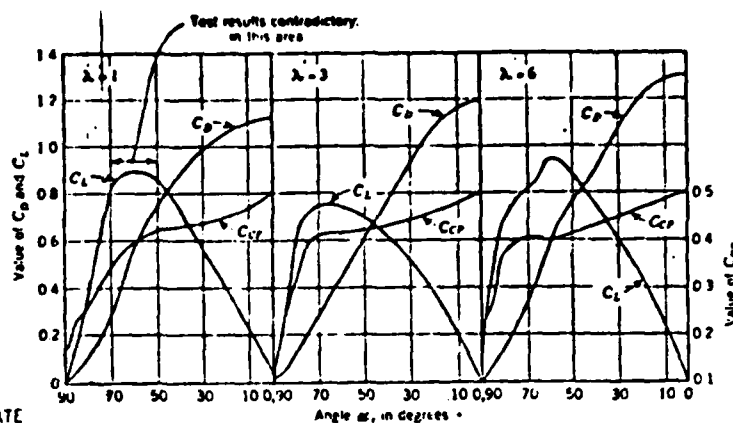
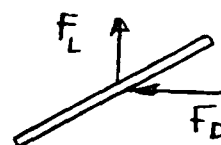


FIG. 5.—WIND PRESSURES ON ELEMENTARY BODIES

(FROM ASCE PAPER 3269)

for $\lambda = 1.6$ at $\alpha = 76^\circ$

$$C_D = .21 \quad C_L = .67 \quad C_{CP} = .51$$



At takeoff rotation

$$F_D = C_D A q$$

$$= .21 (1.17) (135.5) = 33.3 \text{ lbs}$$

$$F_L = C_L A q$$

$$= .67 (1.17) (135.5) = 106.2 \text{ lbs}$$

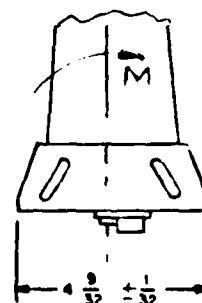
At sea level, antenna cross section drag = 1.64 lbs

Center of pressure on the antenna $\bar{y} = 7.49'$

$$F_D = 33.3 + 1.64 = 34.94 \text{ lbs}$$

$$F_L = 106.2 \text{ lbs}$$

$$M = (106.2 + 34.9) (7.49) = 1057 \text{ IN-LB}$$



SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 33

Technical drawing of a propeller plan view. The drawing shows a central hub with a cross-shaped slot, surrounded by eight holes numbered 1 through 8. The holes are arranged in two rows of four, with the top row holes numbered 5, 7, 8, 6 from left to right, and the bottom row holes numbered 1, 3, 4, 2 from left to right. The drawing includes various dimension lines and labels:

- Overall width: $7\frac{3}{4}$
- Distance from center to the first hole in the top row: $8\frac{1}{4}$
- Distance from center to the first hole in the bottom row: $2\frac{1}{2}$
- Distance from the first hole to the second hole in the top row: $2\frac{3}{8}$
- Distance from the first hole to the second hole in the bottom row: $1\frac{13}{16}$
- Distance from the second hole to the third hole in the top row: $2\frac{15}{32}$
- Distance from the second hole to the third hole in the bottom row: $2\frac{1}{8}$
- Distance from the third hole to the fourth hole in the top row: $2\frac{15}{32}$
- Distance from the third hole to the fourth hole in the bottom row: $4\frac{9}{32}$
- Distance from the fourth hole to the edge: $2\frac{1}{8}$
- Label "FWD" is located near the center of the propeller.
- Label ".203 DIA. 8 HOLES" points to the holes.

Free body diagram of a beam with a triangular load. The beam is 3.88 units long. A triangular load starts at 3 lb/ft at the left end and increases to 7 lb/ft at the right end. The resultant force is 106 lb acting at 3.32 units from the left end. A reaction force of 33 lb acts at the right end. Distances from the right end are .41 and .95 units.

$$F_L \frac{106}{8} = 13.25 \text{ lbs}$$

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 34

Drag load Per bolt

$$F_D = \frac{33}{8} = 4.1 \text{ lbs}$$

Load due to Moment

$$M = \frac{2F}{3.88} \left[(3.88)^2 + (3.22)^2 + (.95)^2 + (.41)^2 \right]$$

$$M = 13.66 F$$

$$F = \frac{1057}{13.66} = 77.4 \text{ lbs}$$

Summation of loads

Bolts # 1 & 2 $F_D = 4.1 \text{ lbs}$

$$F_L = 13.25 + \frac{3.32}{3.88} (77.4) = 79.5 \text{ lbs}$$

Bolts # 3 & 4 $F_D = 4.1 \text{ lbs}$

$$F_L = 13.25 + 77.4 = 90.6 \text{ lbs}$$

Bolts # 5 & 6 $F_D = 4.1 \text{ lbs}$

$$F_L = 13.25 + \frac{.95}{3.88} (77.4) = 32.2 \text{ lbs}$$

Bolts # 7 & 8 $F_D = 4.1 \text{ lbs}$

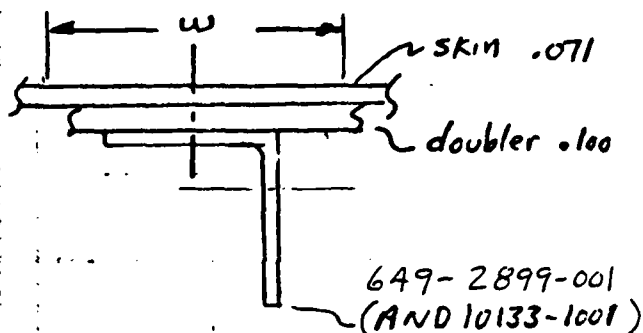
$$F_L = 13.25 + \frac{.41}{3.88} (77.4) = 21.4 \text{ lbs}$$

Pivot Point

$$\Sigma F_L = -223.7 + 106 = -117.7 \text{ lbs}$$

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 35

Section properties of angle installation



Effective width of skin

$$w = 1.9 t \sqrt{E/F_{cy}}$$

Skin: 7475-T761

$$t = .071 \quad (\text{Ref LAC. Dwg 3F30503})$$

$$F_{cy} = 60,000 \text{ psi} \quad (\text{Ref 2})$$

$$F_{tu} = 71,000 \text{ psi}$$

$$w_{\text{skin}} = 1.9 (.071) \sqrt{\frac{10^7}{60 \times 10^3}} = 1.74 \text{ inches}$$

Effective width of doubler

Mat L: 2024-T3 .100 thk

$$F_{cy} = 37,000 \text{ psi} \quad (\text{Ref 2})$$

$$F_{tu} = 62,000 \text{ psi}$$

$$w_{\text{Doubler}} = 3.23$$

Moment of inertia of skin, doubler and angle

$$I = .0326 \text{ in}^4 \quad \bar{y} = .172 \text{ inches}$$

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET 36

Reactions on angle 649-2899-001 (Worst Case)

ANGLE ANTENNA ATTACHMENT

```

*
*      ICES STRUDL-II
*      THE STRUCTURAL DESIGN LANGUAGE
*
*      CIVIL ENGINEERING SYSTEMS LABORATORY
*      MASSACHUSETTS INSTITUTE OF TECHNOLOGY
*      -CAMBRIDGE, MASSACHUSETTS-
*
*      14.24.47      09 OCT 80
*
*      UNIVAC 1100 SERIES EXEC 8
*      VERSION 2.7
*
*****

```

PREPARED BY MAARTEN VET

NODE	COORDINATES		
	X	Y	
1	0.00	0.00	SUPPORT
2	1.03	0.00	
3	4.74	0.00	
4	5.02	0.00	
5	5.82	0.00	SUPPORT

TYPE PLANE FRAME

MEMBER INCIDENCES

1	1	2
2	2	3
3	3	4
4	4	5

MEMBER PROPERTIES

1 TO 4	AX .5569	IZ .0326	SZ .0326
--------	----------	----------	----------

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 37

CONSTANTS

E 1.00E7 ALL

G 3.80E6 ALL

LOADING 'DRAG'

NODE LOADS

2 FORCE Y +90.6
3 FORCE Y +21.4
4 FORCE Y -54.8

Assumptions : 1/2 pivot point load is taken by this angle

STIFFNESS ANALYSIS

UNITS KIPS

OUTPUT DECIMAL 4

LIST FORCES, REACTIONS, DISPLACEMENTS ALL

OUTPUT DECIMAL 3

LIST MAX STRESS, EACH LOAD, ALL MEMBERS, SECT FR DS 0.00 0.20

SIZE A	CODE IDENT 13499	DWG NO. 649-29; 1-001
SCALE	REV	SHEET 38

RESULTS OF LATEST ANALYSIS

PROBLEM - ANGLE TITLE - ANTENNA ATTACHMENT

ACTIVE JOINTS EACH KIPS RADIAN DEGF SECOND

ACTIVE STRUCTURE TYPE PLANE FRAME

ACTIVE COORDINATE AXES X Y

LOADING - DRAG

MEMBER FORCES

MEMBER	JOINT	AXIAL	SHEAR Y	SHEAR Z	TORSIONAL	BENDING Y	BENDING Z
1	1	.0000	-.0813				-.0628
1	2	.0000	.0813				.0250
2	2	.0000	.0093				.0250
2	3	.0000	-.0093				.0090
3	3	.0000	.0307				-.0090
3	4	.0000	-.0307				.0176
4	4	.0000	-.0281				-.0176
4	5	.0000	.0281				.0099

RESULTANT JOINT LOADS - SUPPORTS

JOINT	X FORCE	Y FORCE	Z FORCE	X MOMENT	Y MOMENT	Z MOMENT
1	.0000	-.0813				-.0628
5	.0000	.0281				-.0099
TOTALS	.0000	-.0532				-.0677

JOINT DISPLACEMENTS - SUPPORTS

JOINT	X DISPL	Y DISPL	Z DISPL	X ROT	Y ROT	Z ROT
1	.0000	.0000				.0000
5	.0000	.0000				.0000

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 39

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

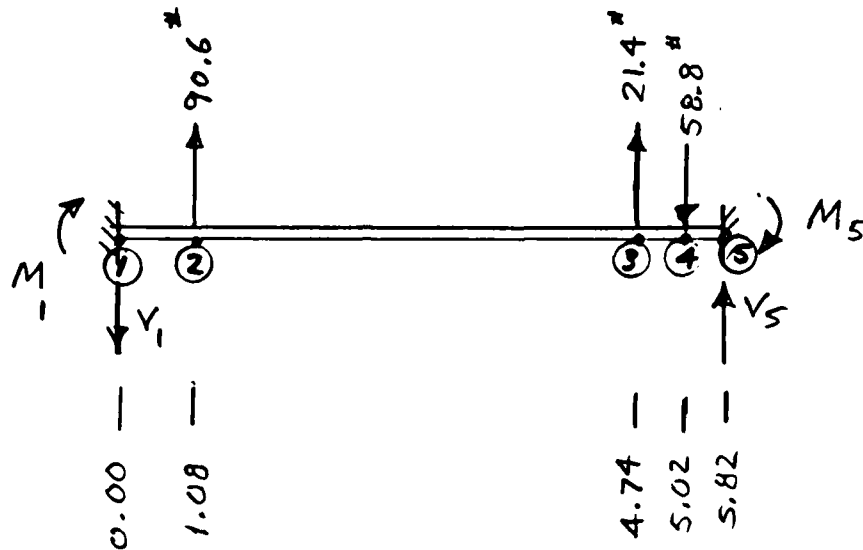
JOINT	DISPLACEMENTS			ROTATIONS		
	X DISPL	Y DISPL	Z DISPL	X ROT	Y ROT	Z ROT
2	.0000	.0001	.0001			.0001
3	.0000	.0000	.0000			.0000
4	.0000	.0000	.0000			.0000

INTERNAL MEMBER RESULTS

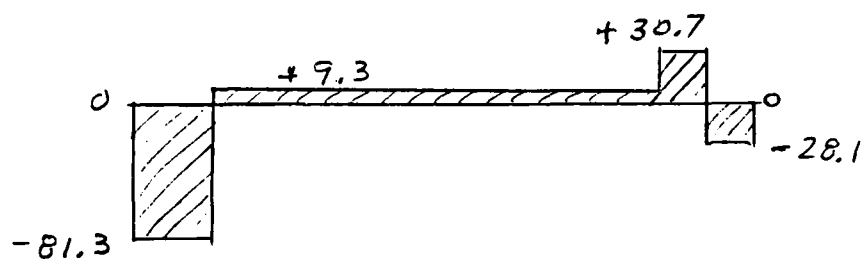
MEMBER MAXIMUM STRESS FOR EACH LOADING

LOADING	DRAG	MEMBER	STRESS		
			MAX NORMAL	AT SECTION	MIN NORMAL
LOADING	DRAG	1	1.927	.0000 FR	-1.927
					.0000 FR
LOADING	DRAG	2	.767	.0000 FR	-.767
					.0000 FR
LOADING	DRAG	3	.540	1.0000 FR	-.540
					1.0000 FR
LOADING	DRAG	4	.540	.0000 FR	-.540
					.0000 FR

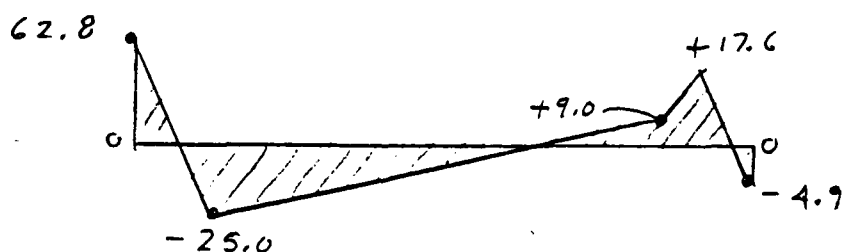
SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 40



ASSUMPTION: THE NAS 623 FASTENERS ATTACHING THE ANGLE TO THE BEAM CAN TRANSFER MOMENT INTO THE A/C ZEE SECTION



SHEAR
(LB)



MOMENT
(IN-LB)

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 41

$$\sigma_3 = \frac{62.8 (1.00)}{.0326} = 1926 \text{ psi}$$

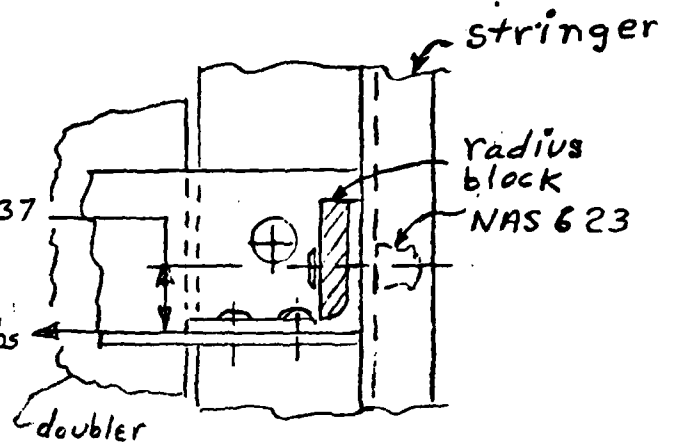
$$MS = \frac{3400}{1926} - 1 \quad \text{--- --- --- : ---} \quad | \quad 16.6$$

$$\rho = \frac{62.8}{.62} = 101 \text{ lbs}$$
$$MS = \frac{884}{101(1.5)} - 1 \quad \text{---} \quad \text{---} \quad \text{---} \quad \text{---} \quad \text{---} \quad \left| \begin{array}{c} 4.8 \\ \hline \end{array} \right.$$

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 42

Use .190 thick radius
block to force P load
into corner of Angle
as a tension load
rather than a bending
load around angle corner.

P = 101 lbs



VIEW A-A

NAS 623-2 bolts will withstand an ultimate
tensile strength of 1740 lbs

M.S. +

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET 43

(b) Connector CUTOUT in Skin

Load capability in skin lost

$$P_{1.5Y} = 71000 (1.12 + .218 + .218)(.071) = 7844 \text{ lbs}$$

the 649-2898 doubler must pick up this load

$$62000 (3.95 - 1.12 - .218 - .218)(.10) = 14843 \text{ lbs}$$

$$MS = \frac{14843}{7844} = 1.89$$

Rivets required to transfer load. Use NAS 1097 D5,
ultimate single shear strength = 690 lbs (Ref 2)

$$\frac{7844}{690} = 11.4 = 12 \text{ rivets}$$

Rivets installed:

12 NAS 1097D5 8280 lbs

4 HAS 1097 AD3 1492 lbs
9772 lbs

$$MS = \frac{9772}{7844} - 1 \quad \text{---} \quad \text{---} \quad \text{---} \quad \text{---} \quad | \quad .24$$

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 44

(C) 649-2884 INSTALLATION

No analysis will be run on the 437S-1C installation on the inflight refueling housing since the antenna at all times is parallel to the line of flight, maximum drag load is 2.55 lbs and the I.R. housing does not carry major structural loads. Any side loads due to yaw maneuvers or roll maneuvers is transferred as shear into the skin and to the structural member of the housing.

Doubler installation (649-2888 doubler)

Load lost by cutout :

skin: 7079-T6 clad .053 thk (Ref 1)

$$F_{+1} = 69000 \text{ psi} \quad (\text{Ref 2})$$

$$P = 69000(.75)(.053) = 2743 \text{ lbs}$$

Doubler 2024 T3 .063 +4k

$$F_{tu} = 62000 \text{ psi}$$

$$P_{\text{capability}} = 62000 (2.5 - .75) (.063) = 683516s$$

$$MS = \frac{6835}{2793} - 1 \quad \text{---} \quad \text{---} \quad \text{---} \quad \text{---} \quad | \quad 1.49$$

Number A520470AD4 rivets required to transfer Load. Single shear strength = 388 lbs (Ref 2)

$$\text{Rivets Reqd} = \frac{2743}{388} = 7$$

Rivets installed = 10

$$M.S. = \frac{10}{7} - 1$$

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001	
SCALE	REV	SHEET	45

(d) Summary

The analysis of the 437S-1C antenna installation shows that it is of sufficient strength to carry the induced loads with the following margins-of-safety

Tensile M.S. = 0.89 (P. 44)

Rivet Shear M.S. = 0.24 (P. 44)

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 46

5.0 SATCOM ANTENNA INSTALLATION

DWG. NO 649-2851

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET 47

↓

Satcom skin doubler installation

Ref dwg	649-2851	Installation
	649-2871	Doubler

the doubler is mounted on the pressure skin
at F.S. 654, LBL 23.0

Strength lost in original skin by CUTOUT

Aircraft SKIN 7079-T6 Clad .053 THK (Ref 1)

$F_{tu} = 69,000 \text{ psi}$ (Ref 2)

$$P_{lost} = 69000 (.053)(.765) = 2998 \text{ lbs}$$

Capability of doubler

2024 T3 .063 THK

$F_{tu} = 60,000 \text{ psi}$ (Ref 2)

$$P_{capability} = 60,000 (2.50 - .765)(.063) = 6558 \text{ lbs}$$

$$MS = \frac{6558}{2998} - 1 \quad \frac{1.34}{\quad}$$

Rivets required to transfer load

Use 6 MS 20470 D5 rivets

$P_{rivet} = 675 \text{ lbs}$ (Ref 2)

$$\text{Rivets required} = \frac{2998}{675} = 4.4 \text{ rivets}$$

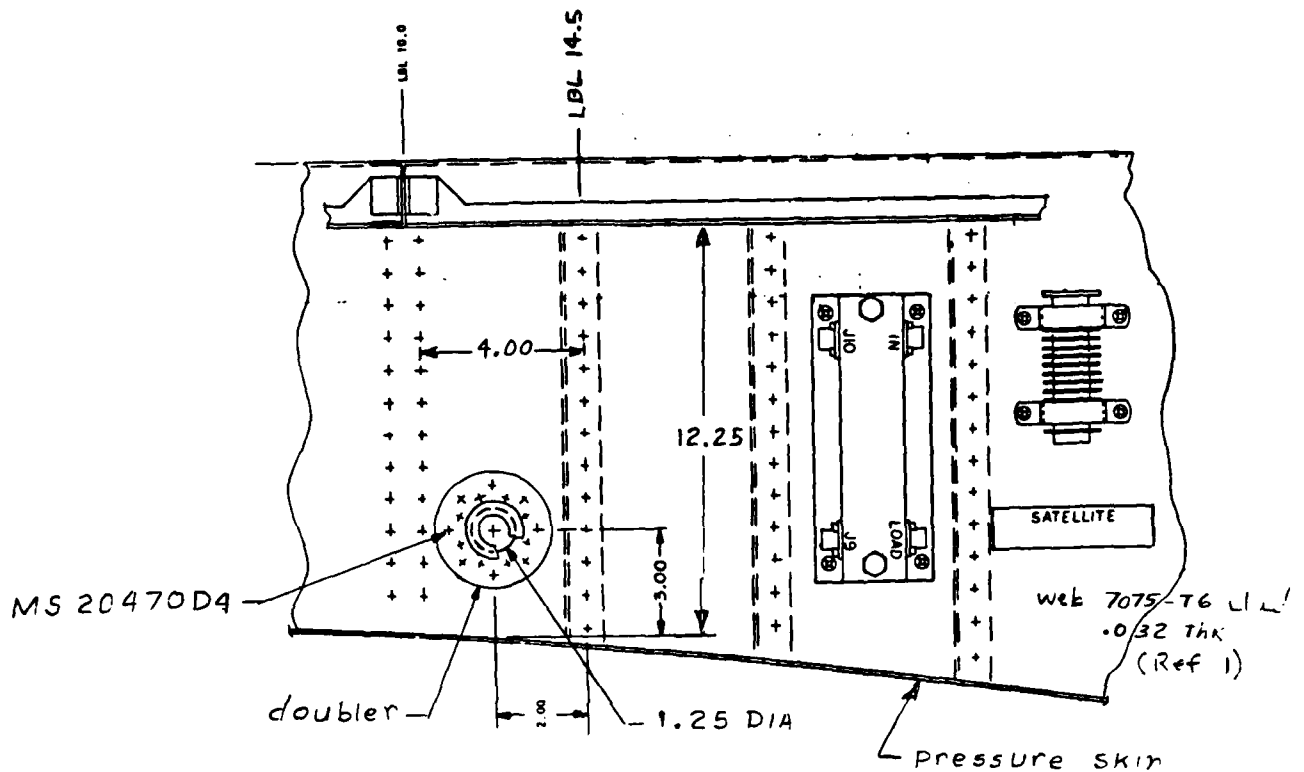
$$M.S. = \frac{6}{4.4} - 1 \quad \frac{.36}{\quad}$$

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 48

↑

F.S. 663 Doubler installation

Ref dwg: 649-2918 doubler.



VIEW LWK AFT
F.S. 663

Buckling Stress in panel

$$a = 12.25$$

$$k = 4$$

$$a/b = 3.06 \quad K = 5.02 \quad (\text{Ref 4 Table 35-4})$$

$$S_{cr} = 5.02 \left(\frac{10.3 \times 10^6}{.89} \right) \left(\frac{.032}{4} \right)^2 = 3718 \text{ psi}$$

$$\gamma = 3718 (.032) = 119 \text{ \#/inch}$$

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 49

Tension load capability lost by cutout

web $F_{tu} = 70,000 \text{ psi}$ (Ref 2)

$$P = 1.25(.032)(70000) = 2800 \text{ lbs}$$

Doubler: 2024 T3 $F_{tu} = 62000 \text{ psi}$

Double strength = $.050(2.00)(62000) = 6200 \text{ lbs}$

$$M.S. = \frac{6200}{2800} - 1 \quad \text{---} \quad \text{---} \quad \text{---} \quad \text{---} \quad \left| \begin{array}{c} 1.21 \\ \hline \end{array} \right.$$

load transfer from web to doubler

MS 20470D4 rivet Single shear strength for .032 mat'l

$$411 \text{ lbs } (.964) = 396 \text{ lbs}$$

8 rivets are used on each symmetry line

$$8(396) = 3168 \text{ lbs}$$

$$MS = \frac{3168}{2800} - 1 \quad \text{---|---|---|---| } 0.13$$

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001	
SCALE	REV	SHEET	50

SUMMARY

AN ANALYSIS WAS PERFORMED ON THE HONEYCOMBY AIRCRAFT PANEL, P/N 3W12010, TO DETERMINE ITS CAPABILITY TO REACT THE FORCES INDUCED INTO IT BY THE UHF ANTENNA DUE TO AERODYNAMIC LOADING. AS THE ANALYSIS PROGRESSED, IT WAS DETERMINED THAT THE ANTENNA SHOULD HAVE A ZERO ANGLE OF ATTACK, RATHER THAN THE 7-DEGREES USED IN THE ANALYSIS: THUS, THE ANALYSIS IS SOMEWHAT TRUNCATED. HOWEVER, THE ANALYSIS DID SHOW THAT THE PANEL IS MORE THAN ADEQUATE TO TAKE OUT THE SHEAR AND BENDING LOADS INDUCED BY THE ANTENNA.

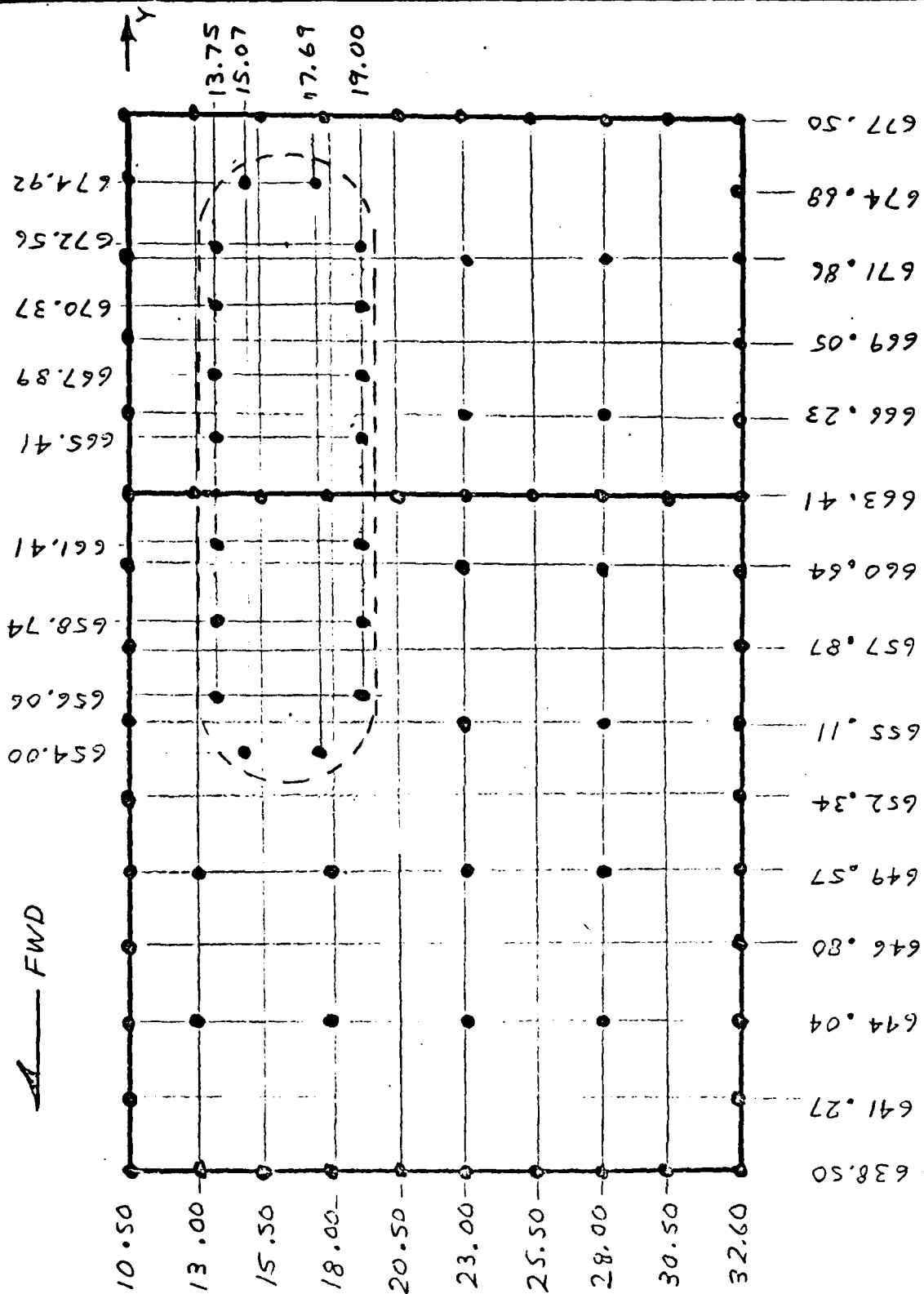
SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 51

1.0 ANALYTICAL MODEL

AN ANALYTICAL MODEL WILL BE MADE OF THE HONEYCOMB AIRCRAFT PANEL TO WHICH THE ANTENNA ATTACHES (SEE LAYOUT THAT FOLLOWS). THE PANEL WILL BE MODELED USING TRIANGULAR FLAT-PLATE ELEMENTS HAVING BOTH SHEAR AND BENDING CAPABILITY. THE ANTENNA WAS ASSUMED TO BE ATTACHED DIRECTLY TO THE AIRCRAFT PANEL WITH THROUGH-BOLT INSERTS IMPLANTED BETWEEN THE HONEYCOMB FACINGS AT EACH ATTACHMENT LOCATIONS. IT SHOULD BE NOTED THAT IN THIS ATTACHMENT CONFIGURATION, THE ANTENNA HAS A NORMAL ANGLE OF ATTACK OF 7-DEGREES.

BECAUSE THE STRUCTURAL COMPUTER CODE USED IN THE ANALYSIS DOES NOT HAVE A HONEYCOMB FINITE ELEMENT IN ITS LIBRARY, AN OVERLAY ELEMENT WAS FABRICATED FOR THIS PURPOSE WITH THE TRUE SHEAR THICKNESS AND AN ARTIFICIAL FLEXURAL MODULUS SO AS TO YIELD THE CORRECT FLEXURAL STIFFNESS.

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET 52



A — FWD

GEOMETRIC LAYOUT
OF THE
ROADWAY PROJECT

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 53

'C141-B' 'DM C34-3/B UHF ANTENNA MOD'

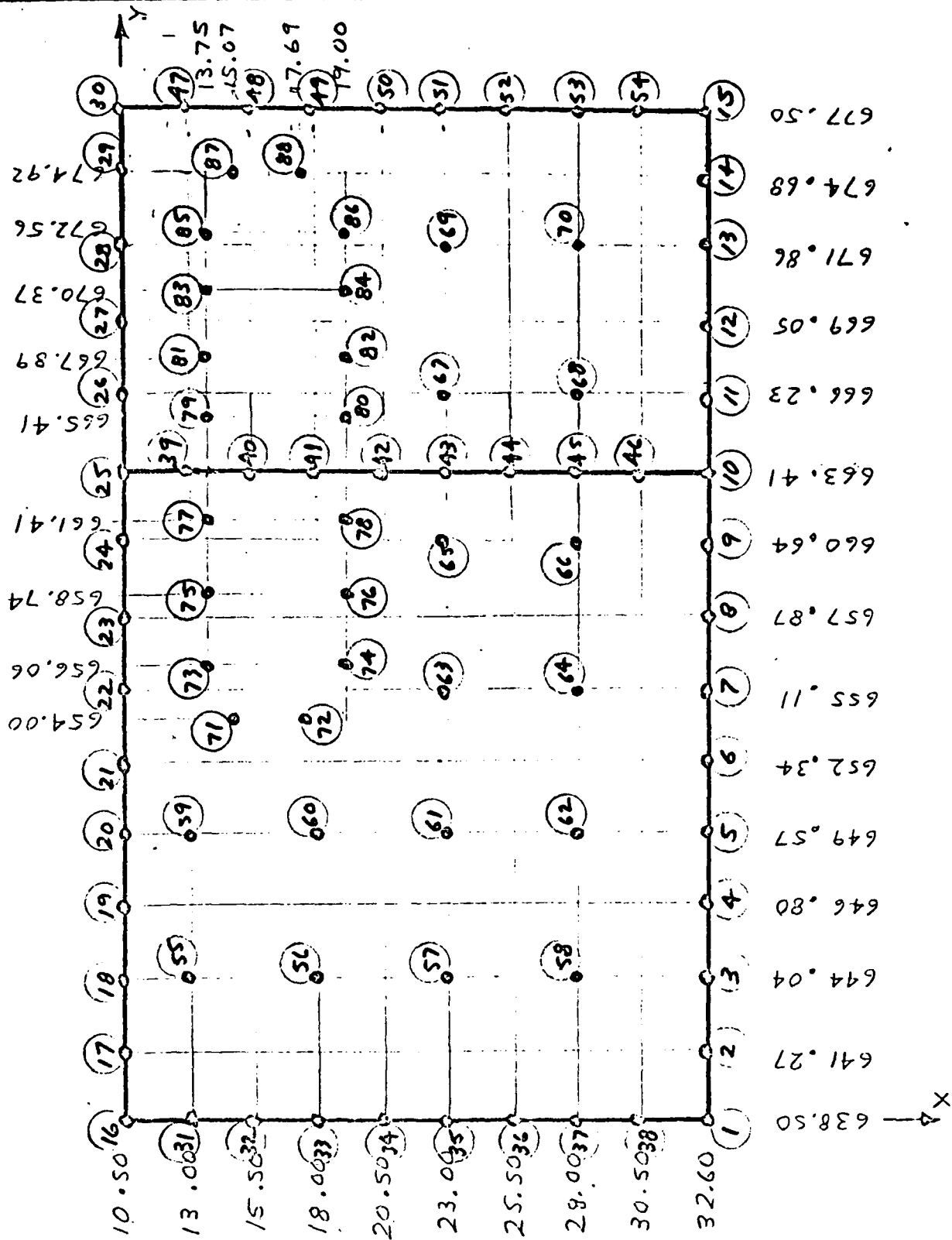
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*****
*
*          ICES STRUDL-II
*    THE STRUCTURAL DESIGN LANGUAGE
*
*    CIVIL ENGINEERING SYSTEMS LABORATORY
*    MASSACHUSETTS INSTITUTE OF TECHNOLOGY
*    CAMBRIDGE, MASSACHUSETTS
*
*    08.18.46          30 JUL 80
*
*    UNIVAC 1100 SERIES EXEC 8
*    VERSION 2.7
*
*****
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PREPARED BY MAARTEN VET

NODE COORDINATES

	X	Y	Z
1	32.60	638.50	289.70
2	32.60	641.27	290.59
3	32.60	644.04	291.48
4	32.60	646.80	293.37
5	32.60	649.57	293.26
6	32.60	652.34	294.14
7	32.60	655.11	295.03
8	32.60	657.87	295.92
9	32.60	660.64	296.81
10	32.60	663.41	297.70
11	32.60	666.23	298.16
12	32.60	669.05	298.62
13	32.60	671.86	299.08
14	32.60	674.68	299.54
15	32.60	677.50	300.00
16	10.50	638.50	295.00
17	10.50	641.27	295.36
18	10.50	644.04	295.71
19	10.50	646.80	296.07
20	10.50	649.57	296.42
21	10.50	652.34	296.78
22	10.50	655.11	297.13
23	10.50	657.87	297.49
24	10.50	660.64	297.84
25	10.50	663.41	298.20
26	10.50	666.23	298.56
27	10.50	669.05	298.92
28	10.50	671.86	299.28

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET 54



SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 55

29	10.50	674.68	299.64
30	10.50	677.50	300.00
31	13.00	638.50	294.95
32	15.50	638.50	294.90
33	18.00	638.50	294.70
34	20.50	638.50	294.50
35	23.00	638.50	294.10
36	25.50	638.50	293.70
37	28.00	638.50	292.75
38	30.50	638.50	291.80
39	13.00	663.41	298.20
40	15.50	663.41	298.20
41	18.00	663.41	298.20
42	20.50	663.41	298.15
43	23.00	663.41	298.10
44	25.50	663.41	298.00
45	28.00	663.41	297.90
46	30.50	663.41	297.80
47	13.00	677.50	300.00
48	15.50	677.50	300.00
49	18.00	677.50	300.00
50	20.50	677.50	300.00
51	23.00	677.50	300.00
52	25.50	677.50	300.00
53	28.00	677.50	300.00
54	30.50	677.50	300.00
55	13.00	644.04	295.67
56	18.00	644.04	295.48
57	23.00	644.04	294.99
58	28.00	644.04	293.92
59	13.00	649.57	296.39
60	18.00	649.57	296.26
61	23.00	649.57	295.88
62	28.00	649.57	295.08
63	23.00	655.11	296.77
64	28.00	655.11	296.25
65	23.00	660.64	297.66
66	28.00	660.64	297.42
67	23.00	666.23	298.86
68	28.00	666.23	298.32
69	23.00	671.86	299.62
70	28.00	671.86	299.16
71	15.07	654.00	296.70
72	17.69	654.00	297.03
73	13.75	656.06	296.88
74	19.00	656.06	297.03
75	13.75	658.74	297.40
76	19.00	658.74	297.42
77	13.75	661.41	297.94
78	19.00	661.41	297.92
79	13.75	665.41	298.51
80	19.00	665.41	298.51
81	13.75	667.89	298.90
82	19.00	667.89	298.90
83	13.75	670.37	299.29
84	19.00	670.37	299.29
85	13.75	672.56	299.63

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 56

86	19.00	672.56	299.63	
87	15.07	674.92	300.00	
88	17.69	674.92	300.00	
101	32.60	638.50	289.50	SUPPORT
102	32.60	641.27	290.09	SUPPORT
103	32.60	644.04	290.98	SUPPORT
104	32.60	646.80	292.87	SUPPORT
105	32.60	649.57	292.76	SUPPORT
106	32.60	652.34	293.64	SUPPORT
107	32.60	655.11	294.53	SUPPORT
108	32.60	657.87	295.42	SUPPORT
109	32.60	660.64	296.31	SUPPORT
110	32.60	663.41	297.20	SUPPORT
111	32.60	666.23	297.61	SUPPORT
112	32.60	669.05	298.12	SUPPORT
113	32.60	671.86	298.58	SUPPORT
114	32.60	674.68	299.04	SUPPORT
115	32.60	677.50	299.50	SUPPORT
116	10.50	638.50	294.50	SUPPORT
117	10.50	641.27	294.86	SUPPORT
118	10.50	644.04	295.21	SUPPORT
119	10.50	646.80	295.57	SUPPORT
120	10.50	649.57	295.72	SUPPORT
121	10.50	652.34	296.28	SUPPORT
122	10.50	655.11	296.63	SUPPORT
123	10.50	657.87	296.99	SUPPORT
124	10.50	660.64	297.34	SUPPORT
125	10.50	663.41	297.70	SUPPORT
126	10.50	666.23	298.06	SUPPORT
127	10.50	669.05	298.42	SUPPORT
128	10.50	671.86	298.78	SUPPORT
129	10.50	674.68	299.14	SUPPORT
130	10.50	677.50	299.50	SUPPORT
131	13.00	638.50	294.45	SUPPORT
132	15.50	638.50	294.40	SUPPORT
133	18.00	638.50	294.20	SUPPORT
134	20.50	638.50	294.00	SUPPORT
135	23.00	638.50	293.60	SUPPORT
136	25.50	638.50	293.20	SUPPORT
137	28.00	638.50	292.25	SUPPORT
138	30.50	638.50	291.30	SUPPORT
139	13.00	663.41	297.70	SUPPORT
140	15.50	663.41	297.70	SUPPORT
141	18.00	663.41	297.70	SUPPORT
142	20.50	663.41	297.65	SUPPORT
143	23.00	663.41	297.60	SUPPORT
144	25.50	663.41	297.50	SUPPORT

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 57



145	28.00	663.41	297.40	SUPPORT
146	30.50	663.41	297.30	SUPPORT
147	13.00	677.50	299.50	SUPPORT
148	15.50	677.50	299.50	SUPPORT
149	18.00	677.50	299.50	SUPPORT
150	20.50	677.50	299.50	SUPPORT
151	23.00	677.50	299.50	SUPPORT
152	25.50	677.50	299.50	SUPPORT
153	28.00	677.50	299.50	SUPPORT
154	30.50	677.50	299.50	SUPPORT

NODE	RELEASES
101 TO 115	FORCE Y MOMENT Y
116 TO 130	FORCE X Y MOMENT Y
131 TO 138	FORCE X Y MOMENT X
139 TO 146	FORCE X
147 TO 154	FORCE X Y MOMENT X

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 58

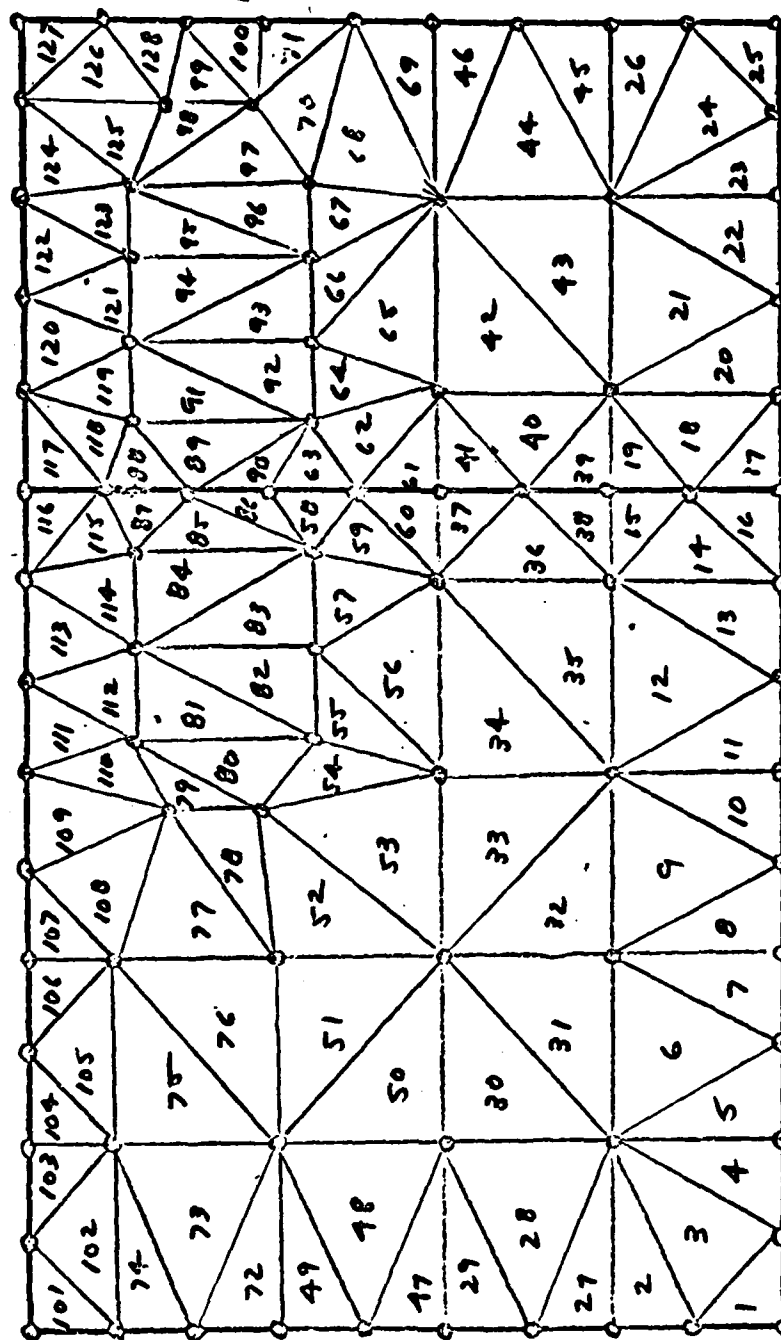


TYPE BENDING

ELEMENT INCIDENCES

1	2	38	1	52	61	72	60
2	38	58	37	53	72	61	63
3	58	38	2	54	72	63	74
4	58	2	3	55	63	76	74
5	4	58	3	56	63	65	76
6	58	4	62	57	76	65	78
7	62	4	5	58	42	41	78
8	6	62	5	59	78	65	42
9	62	6	64	60	42	65	43
10	64	6	7	61	67	42	43
11	8	64	7	62	42	67	80
12	64	8	66	63	41	42	80
13	66	8	9	64	67	82	80
14	66	9	46	65	67	69	82
15	66	46	45	66	82	69	84
16	46	9	10	67	84	69	86
17	11	46	10	68	69	50	86
18	11	68	45	69	50	69	51
19	46	68	45	70	86	50	88
20	12	68	11	71	88	50	49
21	68	12	70	72	56	32	33
22	70	12	13	73	55	32	56
23	14	70	13	74	32	55	31
24	70	14	54	75	56	59	55
25	54	14	15	76	59	56	60
26	70	54	53	77	60	71	59
27	58	36	37	78	71	60	72
28	57	36	58	79	72	73	71
29	36	57	35	80	74	73	72
30	58	61	57	81	74	75	73
31	61	58	62	82	75	74	76
32	64	61	62	83	78	75	76
33	61	64	63	84	75	78	77
34	64	65	63	85	77	78	48
35	65	64	66	86	40	78	41
36	65	66	44	87	40	39	77
37	65	44	43	88	40	79	39
38	44	66	45	89	80	79	40
39	68	44	45	90	80	40	41
40	68	67	44	91	80	81	79
41	44	67	43	92	81	80	82
42	68	69	67	93	84	81	82
43	69	68	70	94	81	84	83
44	70	52	69	95	84	85	83
45	52	70	53	96	85	84	86
46	69	52	51	97	85	86	88
47	57	34	35	98	85	88	87
48	56	34	57				
49	34	56	33				
50	61	56	57				
51	56	61	60				

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 59



SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 60

99	88	48	87
100	48	88	49
101	31	17	16
102	31	55	17
103	17	55	18
104	55	19	18
105	55	59	19
106	19	59	20
107	59	21	20
108	59	71	21
109	21	71	22
110	22	71	73
111	73	23	22
112	23	73	75
113	75	24	23
114	24	75	77
115	39	24	77
116	24	39	25
117	39	26	25
118	26	39	79
119	81	26	79
120	26	81	27
121	27	81	83
122	27	83	28
123	28	83	85
124	85	29	28
125	87	29	85
126	29	87	47
127	29	47	30
128	47	87	48

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001	
SCALE		REV	SHEET 61

↑

TYPE SPACE FRAME

MEMBER INCIDENCES

201	1	101	228	28	128
202	2	102	229	29	129
203	3	103	230	30	130
204	4	104	231	31	131
205	5	105	232	32	132
206	6	106	233	33	133
207	7	107	234	34	134
208	8	108	235	35	135
209	9	109	236	36	136
210	10	110	237	37	137
211	11	111	238	38	138
212	12	112	239	39	139
213	13	113	240	40	140
214	14	114	241	41	141
215	15	115	242	42	142
216	16	116	243	43	143
217	17	117	244	44	144
218	18	118	245	45	145
219	19	119	246	46	146
220	20	120	247	47	147
221	21	121	248	48	148
222	22	122	249	49	149
223	23	123	250	50	150
224	24	124	251	51	151
225	25	125	252	52	152
226	26	126	253	53	153
227	27	127	254	54	154

SIZE A	CODE IDENT 134.99	DWG NO. 649-2924-001
SCALE	REV	SHEET 62



ELEMENT

PROPERTIES

1 TO 128

TYPE 'SBCT' THICKNESS .024

MEMBER

PROPERTIES

201 TO 254

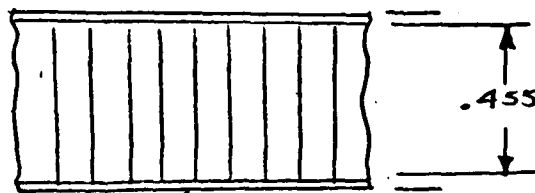
AX .0228 IX .0002 IY .0001 IZ .0001

CONSTANTS

E 1.14E10 ALL
G 3.80E6 ALL
POISSON .33 ALL

E 1.00E7 201 TO 254
G 3.80E6 201 TO 254
POISSON .33 201 TO 254

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET 63



7075-T6 FACINGS, .012-IN. THK.

SHEAR PROPERTIES

$$\text{THICKNESS} = (2)(.012) = .024 - \text{IN}$$

$$G = 3.8 \times 10^6 - \text{PSI}$$

FLEXURAL PROPERTIES

$$\begin{aligned} EI &= (10.0 \times 10^6)(2)(.012 \times 1,000)(.2335)^2 \\ &= .01309 \times 10^6 \text{ LB-IN}^2/\text{IN} \end{aligned}$$

EQUIVALENT ISOTROPIC PLATE .024-IN. THK

$$E_E \left[\frac{1}{12} (1,000)(.024)^3 \right] = 1.152 E_E \times 10^{-6}$$

EQUIVALENT FLEXURAL MODULUS

$$E_E = \frac{.01309 \times 10^6}{1.152 \times 10^{-6}} = 1.136 \times 10^{10} \text{ PSI}$$

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 64

LOADING 'DRAG'

NODE	LOADS		
71.72	FORCE Y	+5.05	FORCE Z +39.36
73.74	FORCE Y	+5.05	FORCE Z +34.63
75.76	FORCE Y	+5.05	FORCE Z +32.38
77.78	FORCE Y	+5.05	FORCE Z +30.13
79.80	FORCE Y	+5.05	FORCE Z +26.77
81.82	FORCE Y	+5.05	FORCE Z +24.69
83.84	FORCE Y	+5.05	FORCE Z +22.60
85.86	FORCE Y	+5.05	FORCE Z +20.76
87.88	FORCE Y	+5.05	FORCE Z +59.32

STIFFNESS ANALYSIS REDUCE BAND ROOT

OUTPUT DECIMAL 3

UNITS KIPS

LIST REACTIONS,DISPLACEMENTS,STRESSES ALL

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 65

2.0- AERODYNAMIC CALCULATIONS

2.1- MAXIMUM DYNAMIC PRESSURE

REFERENCE: T.O. 1C-141A-1, FIGURE 5-8.

- MAX. PERMISSIBLE VELOCITY ABOVE 23,000-FT. ALTITUDE IS $M=0.85$
- MAX PERMISSIBLE VELOCITY BELOW 23,000-FT. ALTITUDE IS 380-KNOTS

2.1.1 - AT 23,000-FT ALTITUDE

$$C = 1025 - \text{FT/SEC}$$

$$\rho = .002378 \left(\frac{P}{P_0} \right) \left(\frac{T_0}{T} \right)$$

$$= (.002378)(.4046) \left(\frac{1}{.819} \right) = .001143 \text{ LB-SEC}^2/\text{FT}^4$$

$$v = (1025)(.85) = 871 \text{ FT/SEC}$$

$$q_{\infty} = \frac{1}{2} \rho v^2$$

$$= \frac{1}{2} (.001143)(871)^2 = 434 - \text{LB/FT}^2$$

2.1.2- AT SEA LEVEL

$$C = 1117 - \text{FT/SEC}$$

$$\rho = .002378 \text{ LB-SEC}^2/\text{FT}^4$$

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET 66

$$V = (380)(1.689) \\ = 642 \text{ FT/SEC} \quad (M = .57)$$

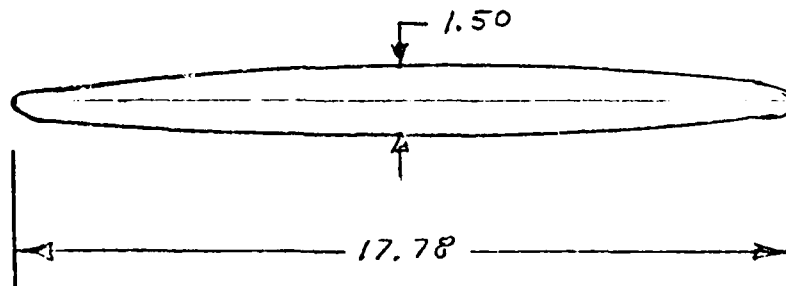
$$\rho_{\infty} = \frac{1}{2} (.002378)(642)^2 = 490 - \text{LB/FT}^2$$

2.2-DRAG & LIFT FORCES

ASSUMPTIONS:

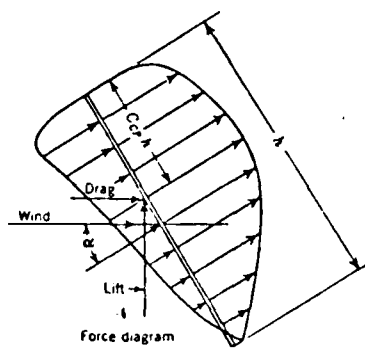
- AS A WORST-CASE, ASSUME THAT THE ANGLE-OF-ATTACK ON THE ANTENNA IS 10° .
- THE SAUCER PORTION OF THE ANTENNA WILL BE TREATED AS A FLAT DISC, RATHER THAN AS AN AIRFOIL.
- THE ENTIRE ANTENNA IS OUTSIDE THE BOUNDARY LAYER. (CONSERVATIVE)

2.2.1 - SAUCER



$$AREA = \frac{\pi}{4} \left(\frac{17.78}{12} \right)^2 = 1.724 - \text{FT}^2$$

SIZE A	CODE IDENT 134.99	DWG NO. 649-2924-001
SCALE	REV	SHEET 67



(d) INCLINED PLATE

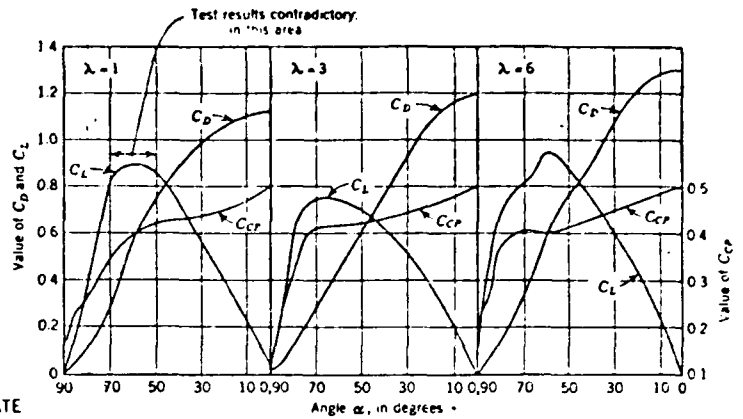


FIG. 5.—WIND PRESSURES ON ELEMENTARY BODIES

(FROM ASCE PAPER 3269)

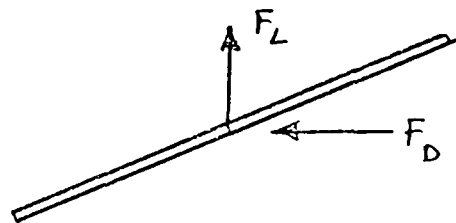
FOR $\lambda=1$ (A SQUARE PLATE) THE DRAG COEFFICIENT IS ALMOST THE SAME AS FOR A CIRCULAR PLATE OF THE SAME AREA.

FROM THE CURVES ABOVE (FOR $\lambda=1$), AT $\alpha=90^\circ$:

$$C_D = .10$$

$$C_L = .40$$

$$C_{CP} = .26$$



(a) AT 23,000-FT ALTITUDE

$$F_D = C_D A \delta_{\infty}$$

$$= (.10)(1.724)(434) = 74.8 \text{ -LB.}$$

$$F_L = C_L A \delta_{\infty}$$

$$= (.40)(1.724)(434) = 299.3 \text{ -LB.}$$

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 68

$$\bar{X} = C_{CD} D = (.26)(17.78) = 4.62 - \text{IN. FROM TOP OF DISC}$$

(b) AT SEA LEVEL

$$F_D = (.10)(1.724)(490) = 84.5 - \text{LB.}$$

$$F_L = (.40)(1.724)(490) = 338.0 - \text{LB.}$$

2.2.2 - BAYONET

REFERENCE: DORNE & MARGOLIN ENGR. REPORT NO. 7051.15, "DM C34-3 ANTENNA AERODYNAMIC ANALYSIS".

$$A_{REF} = 1.237 - \text{FT}^2.$$

(a) AT 23,000-FT ALTITUDE

$$C_D = .06683$$

$$F_D = (.06683)(1.237)(434) = 35.9 - \text{LB}$$

(b) AT SEA LEVEL

$$C_D \approx \frac{1}{2}(.00983 + .01133) = .01058$$

$$F_D = (.01058)(1.237)(490) = 6.4 - \text{LB.}$$

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET 69

2.2.3 - TOTAL ANTENNA

REFERENCE: DORNE & MARGOLIN DRAWING
261D1195, "DM C34-3/B UHF
ANTENNA".

$$\bar{Y}_{\text{SAUCER}} \approx 10.48\text{-IN.}$$

$$\bar{Y}_{\text{BAYONET}} \approx 4.86\text{-IN.}$$

AT 23,000-FT ALTITUDE

$$F_D = 74.8 + 35.9 = 110.7\text{-LB}$$

$$F_L = 299.3\text{-LB}$$

$$\begin{aligned} M &= (74.8)(10.48) + (35.9)(4.86) + (299.3)(4.27) \\ &= 2,236\text{ IN-LB.} \end{aligned}$$

AT SEA LEVEL

$$F_D = 84.5 + 6.4 = 90.9\text{-LB.}$$

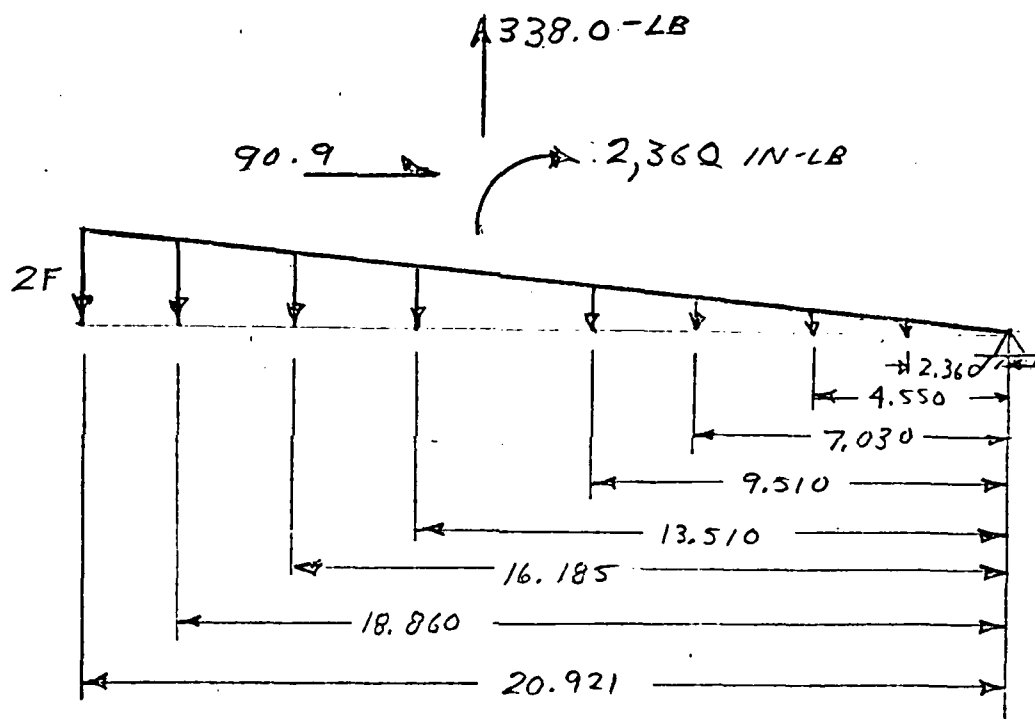
$$F_L = 338.0\text{-LB}$$

$$\begin{aligned} M &= (84.5)(10.48) + (6.4)(4.86) + (338.0)(4.27) \\ &= 2,360\text{ IN-LB.} \end{aligned}$$

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 70

3.0 - FORCES INDUCED INTO THE AIRCRAFT

ASSUMPTION: DUE TO THE STIFFNESS OF THE ANTENNA BAYONET, THE BASE OF THE ANTENNA TENDS TO ROTATE AS A RIGID BODY ABOUT A POINT AT ITS REAR.



RESTORING MOMENT

$$M = \frac{2F}{(20.921)} \left[(20.921)^2 + (18.860)^2 + (16.185)^2 + (13.510)^2 + (9.510)^2 + (7.030)^2 + (4.550)^2 + (2.360)^2 \right]$$

$$= 134.219 F$$

M. VET
7-23-80

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET
		71

$$134.219 F = 2,360$$

$$F = 17.58 - \text{LB}$$

$$\text{SHEAR PER NODE} = \frac{90.9}{18} = 5.05 - \text{LB}$$

$$\text{LIFT PER NODE} = \frac{338.0}{18} = 18.78 - \text{LB}$$

$$\text{NODES 71 TO 88} \quad F_y = +5.05 - \text{LB}$$

$$\text{NODES 71, 72} \quad F_z = 17.58 + 18.78 = +36.36 - \text{LB}$$

$$\text{NODES 73, 74} \quad F_z = (17.58) \left(\frac{18.800}{20.921} \right) + 18.78 = +34.63 - \text{LB}$$

$$\text{NODES 75, 76} \quad F_z = (17.58) \left(\frac{16.185}{20.921} \right) + 18.78 = +32.38 - \text{LB}$$

$$\text{NODES 77, 78} \quad F_z = (17.58) \left(\frac{13.510}{20.921} \right) + 18.78 = +30.13 - \text{LB}$$

$$\text{NODES 79, 80} \quad F_z = (17.58) \left(\frac{9.510}{20.921} \right) + 18.78 = +26.77 - \text{LB}$$

$$\text{NODES 81, 82} \quad F_z = (17.58) \left(\frac{7.030}{20.921} \right) + 18.78 = +24.69 - \text{LB}$$

$$\text{NODES 83, 84} \quad F_z = (17.58) \left(\frac{4.550}{20.921} \right) + 18.78 = +22.60 - \text{LB}$$

$$\text{NODES 85, 86} \quad F_z = (17.58) \left(\frac{2.360}{20.921} \right) + 18.78 = +20.76 - \text{LB}$$

$$\begin{aligned} \text{NODES 87, 88} \quad F_z &= -\frac{1}{2} \left[2(36.36 + 34.63 + 32.38 + 30.13 + 26.77 \right. \\ &\quad \left. + 24.69 + 22.60 + 20.76) - 338.0 \right] \\ &= -59.32 - \text{LB} \end{aligned}$$

M. VET
7-30-90

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 72

4.0- RESULTS OF THE COMPUTER ANALYSIS

4.1- SHEAR IN THE FACINGS

(ONLY SHEAR STRESS ABOVE 10,000-PSI SHOWN)

ELEMENT	STRESS (PSI)
37	10,637
54	15,467
55	17,000
80	14,251
86	22,191
96	12,582
115	10,941

4.2- FLEXURE OF THE HONEYCOMB

$$I = (2)(.012 \times 1.000)(.2335)^2$$

$$C = .2395 \text{ IN.}$$

$$S = \frac{I}{C} = .00546 \text{ IN}^3/\text{IN}$$

BENDING STRESS

$$\sigma = \frac{M}{S} = 183.15 \text{ M - PSI}$$

$$M_{\text{MAX}} = 8.638 \text{ IN-LB/IN IN ELEMENT 60}$$

$$\sigma = (183.15)(8.638) = 1,582 \text{ - PSI}$$

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET 73



[illegible][illegible][illegible][illegible]

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137	.000	.000
140	.000	.000
141	.000	.000
142	.000	.000
143	.000	.000
144	.000	.000
145	.000	.000
146	.000	.000
147	.000	.000
148	.000	.000
149	.000	.000
150	.000	.000
151	.000	.000
152	.000	.000
153	.000	.000
154	.000	.000

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	DISPLACEMENTS			ROTATIONS		
	X DISPL	Y DISPL	Z DISPL	X ROT	Y ROT	Z ROT
1	.000	.000	.000	.000	.000	.000
2	.000	.000	.000	.000	.000	.000
3	.000	.000	.000	.000	.000	.000
4	.000	.000	.000	.000	.000	.000
5	.000	.000	.000	.000	.000	.000
6	.000	.000	.000	.000	.000	.000
7	.000	.000	.000	.000	.000	.000
8	.000	.000	.000	.000	.000	.000
9	.000	.000	.000	.000	.000	.000
10	.000	.000	.000	.000	.000	.000
11	.000	.000	.000	.000	.000	.000
12	.000	.000	.000	.000	.000	.000
13	.000	.000	.000	.000	.000	.000
14	.000	.000	.000	.000	.000	.000
15	.000	.000	.000	.000	.000	.000
16	.000	.000	.000	.000	.000	.000
17	.000	.000	.000	.000	.000	.000
18	.000	.000	.000	.000	.000	.000
19	.000	.000	.000	.000	.000	.000
20	.000	.000	.000	.000	.000	.000
21	.000	.000	.000	.000	.000	.000
22	.000	.000	.000	.000	.000	.000
23	.000	.000	.000	.000	.000	.000
24	.000	.000	.000	.000	.000	.000
25	.000	.000	.000	.000	.000	.000
26	.000	.000	.000	.000	.000	.000
27	.000	.000	.000	.000	.000	.000
28	.000	.000	.000	.000	.000	.000
29	.000	.000	.000	.000	.000	.000
30	.000	.000	.000	.000	.000	.000
31	.000	.000	.000	.000	.000	.000
32	.000	.000	.000	.000	.000	.000
33	.000	.000	.000	.000	.000	.000

RESULTS OF LATEST ANALYSIS

PROBLEM - C141-0 TITLE - OM C34-B/B UHF ANTENNA MOD

ACTIVE UNITS INCH KIPS RADIAN DEGF SECOND

ACTIVE STRUCTURE TYPE SPACE FRAME

ACTIVE COORDINATE AXES X Y Z

LOADING - DRAG

ELEMENT STRESSES

ELEMENT

1	CENTROID	SXX	.26247+00	SYX	.635710+00	SXY	-.237286+00
	VXX		.627331-03	VYX	.683405-03		
	NODE 2	MXX	.137658-02	MYX	.160206-02	MXY	.763459-03
	NODE 50	MXX	.148795-02	MYX	.147222-02	MYY	.597519-03
	NODE 1	MXX	-.132655-02	MYX	-.161444-02	MYY	.600843-03
2	CENTROID	SXX	-.757075+00	SYX	.243176+00	SXY	-.730847+00
	VXX		-.812685-03	VYX	.701199-03		
	NODE 38	MXX	-.152571-03	MYX	-.222128-03	MXY	.615763-03
	NODE 58	MXX	-.178385-02	MYX	-.186513-02	MYY	.901835-04
	NODE 57	MXX	.109137-02	MYX	.115972-02	MYY	.415068-03
3	CENTROID	SXX	-.300581+00	SYX	-.327370+00	SXY	-.499434+00
	VXX		.143300-02	VYX	-.186495-03		
	NODE 58	MXX	-.140220-02	MYX	-.242097-02	MXY	.104305-03
	NODE 58	PXX	-.184388-02	MYX	-.229453-02	MYX	.451651-03
	NODE 2	MXX	.227399-02	MYX	.176145-02	MYX	.126423-03
4	CENTROID	SXX	.296729+00	SYX	-.563072+00	SXY	.834775+00
	VXX		-.855524-03	VYX	-.130919-02		
	NODE 50	MXX	-.152831-02	MYX	-.199410-02	MYX	.151611-03
	NODE 2	MXX	.215757-02	MYX	.705227-03	MYX	.153794-03
	NODE 3	MXX	-.937363-03	MYX	-.105833-02	MYX	-.638440-03
5	CENTROID	SXX	-.121379+01	SYX	.501616+00	SXY	.429671+00
	VXX		.145540-03	VYX	.312194-03		
	NODE 4	MXX	-.403624-03	MYX	.300938-03	MYX	.310183-03
	NODE 50	MXX	-.170732-02	MYX	-.191824-02	MYX	.162127-03

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6	MODE 3	MAX	-.327794-03	MY	-.630416-03	MY	-.603423-03
	CENTROID	SXX	-.244401+01	SY	.363543+00	SKY	-.777001+00
		VXX	.105357-03	VY	-.621033-04		
	MODE 62	MAX	-.143979-03	MY	-.312863-03	MY	.179129-03
	MODE 58	MAX	-.128454-02	MY	-.145193-02	MY	.172258-03
	MODE 4	MAX	.349325-03	MY	-.753371-03	MY	.796576-04
	CENTROID	SXX	-.124172+01	SY	.156258+00	SKY	.115361+01
		VXX	-.121252-02	VY	-.159726-03		
	MODE 62	MAX	.176987-03	MY	.688334-04	MY	-.137608-03
	MODE 4	MAX	.170157-02	MY	.112876-02	MY	-.356111-03
	MODE 5	MAX	-.138657-02	MY	-.107245-02	MY	-.164908-03
	CENTROID	SXX	-.235751+01	SY	-.299218+00	SKY	-.101879+01
		VXX	.807812-03	VY	.353780-03		
	MODE 6	MAX	-.733548-04	MY	.495006-03	MY	.634516-03
	MODE 62	MAX	-.177700-04	MY	-.404622-03	MY	.187025-03
	MODE 5	MAX	-.139593-02	MY	-.107421-02	MY	-.715748-04
	CENTROID	SXX	-.272777+01	SY	.193408+00	SKY	-.924063+00
		VXX	-.364461-03	VY	.236112-04		
	MODE 6	MAX	-.119347-02	MY	-.140123-02	MY	.294452-03
	MODE 64	MAX	-.190725-02	MY	-.293167-02	MY	.313612-03
	MODE 62	MAX	.761262-03	MY	.177719-03	MY	.432148-03
	CENTROID	SXX	-.169229+01	SY	-.132931+01	SKY	-.251827+01
		VXX	.570844-03	VY	-.182485-03		
	MODE 64	MAX	-.338633-02	MY	-.344990-02	MY	.409078-03
	MODE 6	MAX	-.795405-03	MY	-.789329-03	MY	.355463-03
	MODE 7	MAX	.193708-03	MY	.309164-03	MY	-.163995-03
	CENTROID	SXX	-.706313+00	SY	-.267371+01	SKY	-.247128+01
		VXX	.194802-03	VY	-.290770-03		
	MODE 8	MAX	-.113731-03	MY	-.563273-03	MY	.463300-03
	MODE 64	MAX	-.120286-02	MY	-.332824-02	MY	.464973-03
	MODE 7	MAX	.635446-03	MY	.201356-03	MY	-.280041-03
	CENTROID	SXX	-.322033+00	SY	-.189401+01	SKY	-.197591+01
		VXX	.281452-03	VY	-.139282-03		
	MODE 66	MAX	-.126301-02	MY	-.940621-03	MY	.699108-04
	MODE 64	MAX	-.202244-02	MY	-.158696-02	MY	.616369-03
	MODE 8	MAX	.814754-03	MY	-.308422-03	MY	.562129-03
	CENTROID	SXX	.269201+01	SY	-.384173+01	SKY	-.128430+01
		VXX	-.807661-04	VY	.171218-03		
	MODE 66	MAX	.684558-03	MY	.897208-03	MY	.121888-03
	MODE 8	MAX	-.760717-03	MY	-.836187-03	MY	.516352-03
	MODE 9	MAX	-.375142-03	MY	-.487352-04	MY	.447774-03

14	CENTROID	SXX	-.11081+02	SYX	-.222993+01	SXX	.363354+01
	NODE 66	VXX	-.525621-04	VYX	.185507-03	MYX	.233827-03
	NODE 9		-.104871-03	MYX	-.108893-03	MYX	.117046-04
	NODE 46		-.258055-03	MYX	-.254046-03	MYX	.307269-04
			.263547-04	MYX	.459735-03		
15	CENTROID	SXX	-.762859+00	SYX	-.113345+00	SXX	.104997+02
	NODE 66	VXX	.554943-03	VYX	-.512130-03	MYX	-.659077-03
	NODE 46		-.186911-08	MYX	.652525-03	MYX	.254049-04
	NODE 45		.146253-02	MYX	.202421-02	MYX	-.236355-03
			-.132428-02	MYX	-.445858-03		
16	CENTROID	SXX	-.671667+00	SYX	-.194667+01	SXX	.514827+01
	NODE 46	VXX	-.631284-03	VYX	-.173588-03	MYX	-.815130-04
	NODE 9		.125780-02	MYX	.140018-02	MYX	.140354-03
	NODE 10		.105281-02	MYX	.683455-03	MYX	.166558-04
			-.297532-03	MYX	-.394169-03		
17	CENTROID	SXX	.666854+01	SYX	.103441+02	SXX	.801184+01
	NODE 11	VXX	-.675155-03	VYX	.336708-03	MYX	-.245963-03
	NODE 46		.950575-04	MYX	.631014-03	MYX	.225675-03
	NODE 10		.130529-02	MYX	.974775-03	MYX	-.135808-03
			-.377483-03	MYX	-.570890-03		
18	CENTROID	SXX	-.240497+01	SYX	-.802927-01	SXX	.429200+01
	NODE 45	VXX	.306246-03	VYX	.472720-03	MYX	-.778634-04
	NODE 11		-.912068-03	MYX	-.141653-02	MYX	-.781398-04
	NODE 68		.368230-03	MYX	-.135497-03	MYX	.638007-04
			-.521485-05	MYX	.728390-04		
19	CENTROID	SXX	-.842531+01	SYX	.260420+01	SXX	-.206150+01
	NODE 46	VXX	.738653-03	VYX	.230256-03	MYX	-.168996-03
	NODE 68		.944277-03	MYX	.778754-03	MYX	-.518497-04
	NODE 45		.686503-03	MYX	.341280-03	MYX	-.103578-03
			-.109546-02	MYX	-.132719-02		
20	CENTROID	SXX	-.226793+01	SYX	.793087+01	SXX	.882368+00
	NODE 12	VXX	-.678659-04	VYX	-.331746-03	MYX	.133507-04
	NODE 68		-.346296-03	MYX	-.295792-03	MYX	.424429-04
	NODE 11		-.709340-04	MYX	-.912057-04	MYX	.432939-04
			.626894-03	MYX	.710976-03		
21	CENTROID	SXX	-.998438+00	SYX	-.284125+01	SXX	-.827136+01
	NODE 70	VXX	.968067-05	VYX	-.361323-03	MYX	.800644-06
	NODE 46		.167584-03	MYX	.793685-04	MYX	.220248-04
	NODE 68		.271922-03	MYX	.802029-03	MYX	-.340649-03
	NODE 12		.276756-03	MYX	.258502-03		

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22	CENTROID	STX	SVY	STX	SVY	STX	SVY
	NODE 70	VXX	-.285994+00	-.367425-04	-.570804+01	-.149070-03	-.935864+00
	NODE 12	MXV	-.103895-03	-.149877-03	-.221194-03	-.249642-03	-.523517-04
	NODE 13	MYV	-.347131-03	-.149877-03	-.222259-03	-.222259-03	-.179377-04
		MXV					-.369006-04
		MYV					
23	CENTROID	STX	SVY	STX	SVY	STX	SVY
	NODE 14	VXX	-.111914+01	-.442615-04	-.363403+01	-.318151-04	-.152115+01
	NODE 70	MXV	-.142021-03	-.142021-03	-.845000-04	-.845000-04	-.926079-04
	NODE 13	MYV	-.178374-04	-.178374-04	-.145044-03	-.145044-03	-.468690-04
		MXV	-.852345-03	-.852345-03	-.171924-03	-.171924-03	-.624997-04
		MYV					
24	CENTROID	STX	SVY	STX	SVY	STX	SVY
	NODE 54	VXX	-.255037+00	-.430701-04	-.336023+00	-.447658-04	-.234219+01
	NODE 70	MXV	-.225333-04	-.225333-04	-.1678428-04	-.1678428-04	-.926560-04
	NODE 14	MYV	-.128009-04	-.128009-04	-.458135-04	-.458135-04	-.542880-04
	NODE 15	MXV	-.103418-03	-.103418-03	-.197895-03	-.197895-03	-.555552-04
		MYV					
25	CENTROID	STX	SVY	STX	SVY	STX	SVY
	NODE 54	VXX	-.833621+00	-.100511-02	-.168265+01	-.202389-03	-.129206+01
	NODE 14	MXV	-.623377-03	-.623377-03	-.928246-03	-.928246-03	-.134668-03
	NODE 15	MYV	-.100878-03	-.100878-03	-.920309-04	-.920309-04	-.315268-04
		MXV	-.122552-02	-.122552-02	-.354361-03	-.354361-03	-.513701-04
		MYV					
26	CENTROID	STX	SVY	STX	SVY	STX	SVY
	NODE 70	VXX	-.233051+01	-.244335-04	-.173397+01	-.988669-05	-.120853+01
	NODE 54	MXV	-.485119-04	-.485119-04	-.187962-04	-.187962-04	-.734359-03
	NODE 53	MYV	-.952453-04	-.952453-04	-.1598582-04	-.1598582-04	-.104218-04
		MXV	-.180446-04	-.180446-04	-.317944-04	-.317944-04	-.888269-05
		MYV					
27	CENTROID	STX	SVY	STX	SVY	STX	SVY
	NODE 56	VXX	-.217327+01	-.355762-03	-.776765+00	-.268903-03	-.288857-01
	NODE 56	MXV	-.156164-02	-.156164-02	-.150782-02	-.150782-02	-.392126-04
	NODE 57	MYV	-.258220-03	-.258220-03	-.452287-03	-.452287-03	-.164403-04
		MXV	-.878791-03	-.878791-03	-.535604-03	-.535604-03	-.191779-03
		MYV					
28	CENTROID	STX	SVY	STX	SVY	STX	SVY
	NODE 57	VXX	-.260616+01	-.311133-03	-.130400+01	-.483703-03	-.137859+01
	NODE 56	MXV	-.140181-02	-.140181-02	-.109445-02	-.109445-02	-.124496-03
	NODE 58	MYV	-.999954-03	-.999954-03	-.599610-03	-.599610-03	-.256491-04
		MXV	-.183794-02	-.183794-02	-.232449-02	-.232449-02	-.136864-03
		MYV					
29	CENTROID	STX	SVY	STX	SVY	STX	SVY
	NODE 56	VXX	-.230402+01	-.213432-03	-.851993+00	-.430432-03	-.141279+01
	NODE 57	MXV	-.913761-03	-.913761-03	-.288229-04	-.288229-04	-.122993-03
	NODE 57	MYV	-.571793-03	-.571793-03	-.109022-03	-.109022-03	-.365777-04
	NODE 55	MXV	-.576031-03	-.576031-03	-.775983-03	-.775983-03	-.434077-04
		MYV					

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30	CENTROID	SXX	VXX	.556332-01	SYT	.303163-00	SXY	.888594+00
	MODE 50	MAX		-.489220-03	VYT	.328392-03		
	MODE 61	MAX		-.211579-02	MYT	-.235683-02	MAX	.106871-03
	MODE 57	MAX		-.112490-02	MYT	-.126572-02	MAX	.126253-03
		MAX		.908311-03	MYT	.843583-03	MAX	-.102110-03
31	CENTROID	SXX	VXX	-.198644+01	SYT	-.128400+00	SXY	-.124390+01
	MODE 61	MAX		.242657-03	VYT	.111212-03		
	MODE 58	MAX		-.784323-03	MYT	-.964147-03	MAX	.159686-03
	MODE 62	MAX		-.130330-02	MYT	-.134724-02	MAX	.148601-03
		MAX		.26994-03	MYT	.181001-03	MAX	.292391-03
32	CENTROID	SXX	VXX	-.358474+01	SYT	.174516+00	SXY	-.182138+01
	MODE 64	MAX		-.125264-03	VYT	-.395088-03		
	MODE 61	MAX		-.155589-02	MYT	-.222575-02	MAX	.148026-03
	MODE 62	MAX		-.982759-03	MYT	-.121113-02	MAX	.575113-04
		MAX		.643389-03	MYT	.372703-03	MAX	.420400-03
33	CENTROID	SXX	VXX	-.102592+01	SYT	.103487+02	SXY	-.143496+01
	MODE 61	MAX		-.111204-02	VYT	.121331-02		
	MODE 64	MAX		-.214355-02	MYT	-.131923-02	MAX	-.347162-04
	MODE 63	MAX		-.448447-02	MYT	-.466103-02	MAX	.636084-04
		MAX		.401021-02	MYT	.340451-02	MAX	-.697306-03
34	CENTROID	SXX	VXX	.130654+02	SYT	.196405+01	SXY	.494296+01
	MODE 64	MAX		-.105918-02	VYT	.123103-02		
	MODE 65	MAX		-.405141-02	MYT	-.401376-02	MAX	.312114-03
	MODE 63	MAX		.261196-02	MYT	.296319-02	MAX	.260652-03
		MAX		.346056-02	MYT	.233333-02	MAX	-.118014-02
35	CENTROID	SXX	VXX	.103842+02	SYT	-.205789+01	SXY	.213045+01
	MODE 65	MAX		-.886574-03	VYT	.691468-03		
	MODE 64	MAX		.569847-02	MYT	.491494-02	MAX	-.393029-03
	MODE 66	MAX		-.193924-02	MYT	-.122070-02	MAX	-.142736-03
		MAX		-.164893-02	MYT	.135255-02	MAX	.337234-03
36	CENTROID	SXX	VXX	.562081+01	SYT	-.126710+02	SXY	-.286414+00
	MODE 65	MAX		-.137188-02	VYT	-.119947-02		
	MODE 66	MAX		.413745-02	MYT	.502820-02	MAX	-.644366-03
	MODE 44	MAX		.726763-03	MYT	.121174-02	MAX	-.382029-03
		MAX		-.312827-02	MYT	-.203114-02	MAX	-.149434-02
37	CENTROID	SXX	VXX	-.166170+02	SYT	-.223091+01	SXY	.106366+02
	MODE 65	MAX		-.186300-03	VYT	-.442021-02		
	MODE 44	MAX		.843218-02	MYT	.842688-02	MAX	-.392356-03
	MODE 43	MAX		.589080-03	MYT	.614134-03	MAX	-.430303-03
		MAX		-.350070-02	MYT	-.694946-02	MAX	-.134142-02
38	CENTROID	SXX	VXX	-.100759+02	SYT	-.129119+01	SXY	.812703+01

NUDE 63	MAX	.201817-02	MY	.284541-02	MY	.460026-04
NUDE 74	MAX	-.168823-02	MY	-.149125-02	MY	.442900-04
CENTROID	SXX	-.183479+02	SY	-.316216+01	SX	-.170003+02
	VXX	.195532-02	VY	.143931-02		
NUDE 63	MAX	.328671-02	MY	.561414-02	MY	-.260501-03
NUDE 76	MAX	.320353-02	MY	.349151-02	MY	-.202125-03
NUDE 74	MAX	-.307182-02	MY	-.215508-02	MY	.870176-05
CENTROID	SXX	.639408+01	SY	.121923+02	SX	-.881489+01
	VXX	.838935-03	VY	.313677-03		
NUDE 63	MAX	.370039-02	MY	.365287-02	MY	-.333855-04
NUDE 65	MAX	.408722-02	MY	.345394-02	MY	.902618-04
NUDE 76	MAX	-.430956-03	MY	.234167-03	MY	.1053336-03
CENTROID	SXX	.224326+01	SY	-.111444+01	SX	-.795929+01
	VXX	.120006-03	VY	-.310298-03		
NUDE 76	MAX	.176533-02	MY	.238226-02	MY	.4680087-03
NUDE 65	MAX	.401202-02	MY	.485374-02	MY	.35913-03
NUDE 78	MAX	-.765012-05	MY	.182405-02	MY	.80185-03
CENTROID	SXX	-.256835+02	SY	.114464+02	SX	.752246+01
	VXX	.112771-02	VY	-.263614-02		
NUDE 78	MAX	.536138-02	MY	.380293-02	MY	-.560899-04
NUDE 42	MAX	.150167-02	MY	-.562604-03	MY	.169347-03
NUDE 41	MAX	-.236802-03	MY	-.618613-02	MY	.443758-03
CENTROID	SXX	.106330+02	SY	.103035+02	SX	-.165958+01
	VXX	-.199769-02	VY	-.150361-02		
NUDE 78	MAX	.447605-02	MY	.283862-02	MY	-.106724-02
NUDE 65	MAX	.578713-02	MY	.535001-02	MY	-.309680-03
NUDE 42	MAX	-.317079-02	MY	-.515683-02	MY	.438561-03
CENTROID	SXX	-.198129+02	SY	.483091+01	SX	-.631801+01
	VXX	-.110833-02	VY	-.416218-02		
NUDE 42	MAX	.238352-03	MY	-.109238-02	MY	.879413-04
NUDE 65	MAX	.813784-02	MY	.818659-02	MY	-.413303-03
NUDE 43	MAX	-.268478-02	MY	-.743023-02	MY	-.662086-03
CENTROID	SXX	-.170692+02	SY	-.225183-01	SX	.907709+01
	VXX	.436012-04	VY	.277003-02		
NUDE 67	MAX	.461193-02	MY	.339117-02	MY	.521299-04
NUDE 42	MAX	-.134349-02	MY	-.256359-02	MY	.976718-04
NUDE 43	MAX	-.263506-02	MY	-.690346-02	MY	-.151210-03
CENTROID	SXX	.476020+01	SY	.106658+02	SX	-.685972+00
	VXX	-.240295-02	VY	.134879-02		
NUDE 67	MAX	.139252-02	MY	.464501-03	MY	.4124413-03
NUDE 80	MAX	.413378-02	MY	.218710-02	MY	.977507-03

63	64	65	66	67	68	69	70
NUDE 42	NUDE 42	NUDE 42	NUDE 42	NUDE 42	NUDE 42	NUDE 42	NUDE 42
NUDE 40	NUDE 40	NUDE 40	NUDE 40	NUDE 40	NUDE 40	NUDE 40	NUDE 40
NUDE 41	NUDE 41	NUDE 41	NUDE 41	NUDE 41	NUDE 41	NUDE 41	NUDE 41
NUDE 43	NUDE 43	NUDE 43	NUDE 43	NUDE 43	NUDE 43	NUDE 43	NUDE 43
NUDE 44	NUDE 44	NUDE 44	NUDE 44	NUDE 44	NUDE 44	NUDE 44	NUDE 44
NUDE 45	NUDE 45	NUDE 45	NUDE 45	NUDE 45	NUDE 45	NUDE 45	NUDE 45
NUDE 46	NUDE 46	NUDE 46	NUDE 46	NUDE 46	NUDE 46	NUDE 46	NUDE 46
NUDE 47	NUDE 47	NUDE 47	NUDE 47	NUDE 47	NUDE 47	NUDE 47	NUDE 47
NUDE 48	NUDE 48	NUDE 48	NUDE 48	NUDE 48	NUDE 48	NUDE 48	NUDE 48
NUDE 49	NUDE 49	NUDE 49	NUDE 49	NUDE 49	NUDE 49	NUDE 49	NUDE 49
NUDE 50	NUDE 50	NUDE 50	NUDE 50	NUDE 50	NUDE 50	NUDE 50	NUDE 50
NUDE 51	NUDE 51	NUDE 51	NUDE 51	NUDE 51	NUDE 51	NUDE 51	NUDE 51
NUDE 52	NUDE 52	NUDE 52	NUDE 52	NUDE 52	NUDE 52	NUDE 52	NUDE 52
NUDE 53	NUDE 53	NUDE 53	NUDE 53	NUDE 53	NUDE 53	NUDE 53	NUDE 53
NUDE 54	NUDE 54	NUDE 54	NUDE 54	NUDE 54	NUDE 54	NUDE 54	NUDE 54
NUDE 55	NUDE 55	NUDE 55	NUDE 55	NUDE 55	NUDE 55	NUDE 55	NUDE 55
NUDE 56	NUDE 56	NUDE 56	NUDE 56	NUDE 56	NUDE 56	NUDE 56	NUDE 56
NUDE 57	NUDE 57	NUDE 57	NUDE 57	NUDE 57	NUDE 57	NUDE 57	NUDE 57
NUDE 58	NUDE 58	NUDE 58	NUDE 58	NUDE 58	NUDE 58	NUDE 58	NUDE 58
NUDE 59	NUDE 59	NUDE 59	NUDE 59	NUDE 59	NUDE 59	NUDE 59	NUDE 59
NUDE 60	NUDE 60	NUDE 60	NUDE 60	NUDE 60	NUDE 60	NUDE 60	NUDE 60
NUDE 61	NUDE 61	NUDE 61	NUDE 61	NUDE 61	NUDE 61	NUDE 61	NUDE 61
NUDE 62	NUDE 62	NUDE 62	NUDE 62	NUDE 62	NUDE 62	NUDE 62	NUDE 62
NUDE 63	NUDE 63	NUDE 63	NUDE 63	NUDE 63	NUDE 63	NUDE 63	NUDE 63
NUDE 64	NUDE 64	NUDE 64	NUDE 64	NUDE 64	NUDE 64	NUDE 64	NUDE 64
NUDE 65	NUDE 65	NUDE 65	NUDE 65	NUDE 65	NUDE 65	NUDE 65	NUDE 65
NUDE 66	NUDE 66	NUDE 66	NUDE 66	NUDE 66	NUDE 66	NUDE 66	NUDE 66
NUDE 67	NUDE 67	NUDE 67	NUDE 67	NUDE 67	NUDE 67	NUDE 67	NUDE 67
NUDE 68	NUDE 68	NUDE 68	NUDE 68	NUDE 68	NUDE 68	NUDE 68	NUDE 68
NUDE 69	NUDE 69	NUDE 69	NUDE 69	NUDE 69	NUDE 69	NUDE 69	NUDE 69
NUDE 70	NUDE 70	NUDE 70	NUDE 70	NUDE 70	NUDE 70	NUDE 70	NUDE 70

71	CENTROID	SXX	.376841-01	SVY	-.185724+01	SXY	-.327507+01
	NODE 88	VXX	-.625062-03	VYY	.303903-03		
	NODE 50		-.616851-03		-.725205-03	MYX	.288119-04
	NODE 49		-.110612-02	MYV	-.130119-02	MYV	.959503-05
			.659555-03	MYV	.303590-03	MYV	.476954-05
72	CENTROID	SXX	-.197820+01	SVY	-.719142+00	SXY	.297841+01
	NODE 56	VXX	-.560398-03	VYY	.100385-03		
	NODE 52		.535532-03	MYV	.479473-03	MYX	.273285-04
	NODE 53		.354931-03	MYV	.414310-03	MYX	-.189854-03
			-.626727-03	MYV	-.560561-03	MYX	-.111585-04
73	CENTROID	SXX	.157476+01	SVY	-.617972+00	SXY	.189509+01
	NODE 55	VXX	.139629-03	VYY	-.541126-04		
	NODE 52		.325942-03	MYV	-.122258-04	MYX	-.183963-03
	NODE 56		.172227-03	MYV	-.643904-05	MYX	-.172503-03
			.821334-03	MYV	.691873-03	MYX	-.226920-03
74	CENTROID	SXX	-.174875+01	SVY	-.100424+01	SXY	.176137+01
	NODE 52	VXX	.217731-03	VYY	-.115886-03		
	NODE 55		.226464-03	MYV	.254521-03	MYX	-.218552-03
	NODE 51		.986741-04	MYV	.238916-03	MYX	-.252025-03
			-.295107-03	MYV	-.114544-03	MYX	-.220092-03
75	CENTROID	SXX	.563759+00	SVY	.169153+01	SXY	.736221-01
	NODE 56	VXX	.168077-03	VYY	.176757-05		
	NODE 59		.926972-03	MYV	.818402-03	MYX	-.209269-03
	NODE 55		.712512-03	MYV	.659960-03	MYX	-.244215-03
			.386076-04	MYV	.744076-04	MYX	-.189618-03
76	CENTROID	SXX	.631782+01	SVY	.330994+01	SXY	.983640+00
	NODE 59	VXX	.250424-03	VYY	.344105-04		
	NODE 56		.209988-03	MYV	-.977272-04	MYX	-.796188-04
	NODE 60		.554921-03	MYV	.225376-03	MYX	-.583259-04
			.157612-02	MYV	.107855-02	MYX	-.103115-03
77	CENTROID	SXX	.282264+01	SVY	-.317934+01	SXY	-.192860+01
	NODE 60	VXX	.930332-04	VYY	-.393265-04		
	NODE 71		.140539-02	MYV	.593377-03	MYX	-.197045-03
	NODE 59		.727627-03	MYV	.430715-03	MYX	-.257331-03
			.454180-03	MYV	.404414-03	MYX	.778440-04
78	CENTROID	SXX	-.165119+01	SVY	.871078+01	SXY	.848874+00
	NODE 71	VXX	-.102320-02	VYY	-.561010-03		
	NODE 60		.273908-02	MYV	.168724-02	MYX	.392842-03
	NODE 72		.135458-02	MYV	.863703-03	MYX	.174538-03
			-.675010-03	MYV	-.778579-03	MYX	.491199-05

79	CENTROID	SXX	-410316+00	SY	-838499+01	SXX	.116741+01
	NUDE 72	VXX	.993768-03	VY	-.260789-02		
	NUDE 73	MX	-.193139-02	MY	-.201008-02	MX	.555298-03
	NUDE 74	MX	-.274947-02	MY	-.298058-02	MX	.581364-03
	NUDE 75	MX	.216792-02	MY	.193313-02	MX	.425583-03
80	CENTROID	SXX	-.563577+01	SY	.399715+01	SXX	.142505+02
	NUDE 72	VXX	.244514-03	VY	.649991-04		
	NUDE 73	MX	-.680153-03	MY	-.109170-02	MX	-.210184-03
	NUDE 74	MX	-.550084-03	MY	-.484008-03	MX	-.527461-03
	NUDE 75	MX	.379098-06	MY	.365669-04	MX	-.373217-03
81	CENTROID	SXX	-.136323+02	SY	-.157333+01	SXX	-.627272+01
	NUDE 72	VXX	-.194694-02	VY	.409093-02		
	NUDE 73	MX	-.373121-03	MY	.176112-03	MX	.118341-03
	NUDE 74	MX	.788292-02	MY	.829742-02	MX	.608927-04
	NUDE 75	MX	.643839-04	MY	-.339081-02	MX	.600474-03
82	CENTROID	SXX	.578256+01	SY	-.668025+01	SXX	.769346+01
	NUDE 72	VXX	-.758196-03	VY	.156828-02		
	NUDE 73	MX	.403111-02	MY	.420412-02	MX	-.239619-04
	NUDE 74	MX	-.172291-02	MY	-.177383-02	MX	-.249597-03
	NUDE 75	MX	-.112274-02	MY	.209953-02	MX	.113053-03
83	CENTROID	SXX	.436643+01	SY	-.237369+01	SXX	-.701265+01
	NUDE 72	VXX	-.306172-03	VY	.342235-03		
	NUDE 73	MX	.209589-02	MY	.247459-02	MX	.410412-03
	NUDE 74	MX	.434552-02	MY	.541524-02	MX	.290831-04
	NUDE 75	MX	-.118260-02	MY	.132299-02	MX	.330845-03
84	CENTROID	SXX	.370376+01	SY	.514148+01	SXX	-.532331+01
	NUDE 72	VXX	-.126447-02	VY	-.381426-02		
	NUDE 73	MX	.755283-02	MY	.810122-02	MX	.323077-03
	NUDE 74	MX	.568375-03	MY	.153759-02	MX	.535227-04
	NUDE 75	MX	-.717304-04	MY	-.238311-02	MX	.120374-03
85	CENTROID	SXX	.270530+01	SY	-.625067+00	SXX	.215193+01
	NUDE 72	VXX	.735839-04	VY	-.412768-03		
	NUDE 73	MX	-.271832-03	MY	-.377689-03	MX	.286262-04
	NUDE 74	MX	-.878614-03	MY	.664171-03	MX	.494433-04
	NUDE 75	MX	-.486314-03	MY	-.140704-02	MX	-.173298-04
86	CENTROID	SXX	-.115526+02	SY	-.158895+02	SXX	-.221913+02
	NUDE 72	VXX	.422695-03	VY	-.520620-02		
	NUDE 73	MX	-.172705-02	MY	-.237616-02	MX	.938257-03
	NUDE 74	MX	.633582-02	MY	.434055-02	MX	.119488-03
	NUDE 75	MX	-.368496-02	MY	-.661960-02	MX	.912338-03

87	CENTROID	SXX	-246351-02	SY	.469902+00	SX	-137509+01
	MODE 77	VXX	.347156-03	VY	-.615150-03		
	MODE 40		.162231-02		-.172407-02	MX	.665101-03
	MODE 39		.163414-03		-.339721-02	MY	-.844275-04
			-.738583-03		-.425517-02	MX	.299014-03
88	CENTROID	SXX	-218061+02	SY	.904256+01	SX	-.586601+01
	MODE 40	VXX	.109113-02	VY	.372036-02		
	MODE 79		.964557-03		-.983611-03	MX	-.844275-04
	MODE 39		.693001-02		.507676-02	MY	-.409682-03
			-.907519-03		-.645103-02	MX	-.983319-03
89	CENTROID	SXX	.882781+00	SY	.363144+01	SX	-.851809+01
	MODE 80	VXX	-.127091-02	VY	.277231-02		
	MODE 79		.210433-02		.137156-02	MX	.233027-03
	MODE 40		.556911-02		.352830-02	MY	.233027-03
			-.303458-02		-.465555-02	MX	.527132-03
90	CENTROID	SXX	-.112967+02	SY	-.191138+02	SX	.359033+01
	MODE 80	VXX	.319017-03	VY	.458583-02		
	MODE 40		.391141-02		.195390-02	MX	.129353-02
	MODE 79		-.203863-02		-.360719-02	MY	.938257-03
			-.442001-02		-.757233-02	MX	.783577-03
91	CENTROID	SXX	.311994+01	SY	.104107+02	SX	-.574965+01
	MODE 80	VXX	.531496-03	VY	-.189029-02		
	MODE 81		-.205193-03		.728244-03	MX	.233025-03
	MODE 79		-.254949-04		.265633-03	MY	-.155169-03
			.331319-02		.450830-02	MX	.339276-04
92	CENTROID	SXX	-.595324-02	SY	-.532839+01	SX	-.676780+01
	MODE 81	VXX	.342412-03	VY	-.141733-02		
	MODE 80		.2435915-02		.262315-02	MX	-.243981-03
	MODE 82		.181703-02		.233330-02	MY	-.255957-04
			-.113861-02		-.894293-03	MX	-.134786-03
93	CENTROID	SXX	-.268212-01	SY	-.539163+01	SX	.388259+01
	MODE 84	VXX	.321487-03	VY	.135345-02		
	MODE 81		.311382-02		.296756-02	MX	-.505128-04
	MODE 82		.246004-02		.262585-02	MY	-.243980-03
			-.474971-03		-.467386-03	MX	-.172446-03
94	CENTROID	SXX	-.204435+01	SY	.117632+02	SX	.369365+01
	MODE 81	VXX	-.304461-03	VY	-.859759-03		
	MODE 84		.220569-02		.198639-02	MX	-.522745-03
	MODE 83		.505895-03		.433374-03	MY	-.962243-04
			.641555-03		-.206771-03	MX	-.507269-04
95	CENTROID	SXX	.444802+00	SY	.691613+01	SX	.636876+01

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104	NUDE 17	MAX	.582327-04	MY	.156363-03	MY	-.306928-03
	NUDE 55	MAX	.124403-05	MY	.456282-03	MY	-.249924-03
	NUDE 18	MAX	-.163704-03	MY	.410106-04	MY	-.266237-03
	CENTROID	SXX	.402433+00	SVY	-.821380+01	SXX	-.633726+00
		VXX	.160392-03	VYV	.734417-03		
	NUDE 55	MAX	.318114-03	MY	.360743-03	MY	-.237271-03
	NUDE 19	MAX	.125278-03	MY	.162229-03	MY	-.249548-03
	NUDE 18	MAX	-.138239-03	MY	-.109707-04	MY	-.242511-03
	CENTROID	SXX	-.164685+01	SVY	-.104500-01	SXX	.290193+01
		VXX	.171684-03	VYV	.800376-04		
	NUDE 55	MAX	.294960-03	MY	.296138-03	MY	-.198337-03
	NUDE 59	MAX	.654081-03	MY	.692591-03	MY	-.193642-03
	NUDE 19	MAX	-.780479-04	MY	-.207759-04	MY	-.270365-03
	CENTROID	SXX	.633599+01	SVY	-.189456+02	SXX	.368425+01
		VXX	.251957-03	VYV	-.177481-03		
	NUDE 19	MAX	.331803-03	MY	.349991-03	MY	-.204855-03
	NUDE 59	MAX	.706196-03	MY	.701768-03	MY	-.670602-04
	NUDE 20	MAX	-.238872-03	MY	-.192977-03	MY	-.134719-03
	CENTROID	SXX	.454534+01	SVY	-.108097+02	SXX	-.873865+01
		VXX	.302775-03	VYV	.204928-03		
	NUDE 59	MAX	.720431-03	MY	.705878-03	MY	-.679333-04
	NUDE 21	MAX	.616554-03	MY	.545061-03	MY	.258934-04
	NUDE 20	MAX	-.227293-03	MY	-.301117-03	MY	-.238884-04
	CENTROID	SXX	-.449601+01	SVY	.462192+01	SXX	-.990615+00
		VXX	-.419604-05	VYV	-.606320-04		
	NUDE 59	MAX	.653020-03	MY	.363759-03	MY	.421062-04
	NUDE 71	MAX	.539972-03	MY	.351665-03	MY	-.876269-04
	NUDE 21	MAX	.193273-03	MY	.113425-03	MY	-.347819-04
	CENTROID	SXX	-.530332+01	SVY	.181889+01	SXX	-.141821+01
		VXX	-.232874-03	VYV	-.168209-03		
	NUDE 21	MAX	.509442-03	MY	.380091-03	MY	-.687547-04
	NUDE 71	MAX	.714974-03	MY	.468085-03	MY	-.828624-04
	NUDE 22	MAX	-.917016-04	MY	-.271657-03	MY	-.675252-04
	CENTROID	SXX	-.790813+01	SVY	-.200468+01	SXX	.171403+01
		VXX	-.128601-02	VYV	-.131397-02		
	NUDE 22	MAX	-.118823-02	MY	.124627-03	MY	-.268935-03
	NUDE 71	MAX	.946755-03	MY	.187925-02	MY	-.228571-03
	NUDE 73	MAX	-.283791-02	MY	-.169227-02	MY	-.681471-03
	CENTROID	SXX	.124501+01	SVY	-.324639+01	SXX	.556701+01
		VXX	-.273664-03	VYV	-.409702-03		
	NUDE 73	MAX	-.587898-03	MY	.158805-03	MY	-.413015-03

112	NODE 23	MX	-.109427-02	MY	.278930-04	MX	-.561080-03
	NODE 22	MX	.686945-04	MY	.120626-02	MX	-.240815-03
	CENTROID	SX	.621477+01	SY	.392102+00	SX	.861635+01
		VX	.125727-02	VY	.432386-02		
	NODE 23	MX	-.210946-02	MY	-.230707-02	MX	.345773-03
	NODE 73	MX	-.542442-02	MY	-.561082-02	MX	.724504-04
	NODE 75	MX	.619556-02	MY	.843095-02	MX	.582787-03
113	CENTROID	SX	.287543+01	SY	-.898522+01	SX	.799760+00
		VX	.754407-03	VY	.498470-03		
	NODE 75	MX	.434383-02	MY	.449112-02	MX	.351969-03
	NODE 24	MX	.172431-02	MY	.183888-02	MX	.606737-03
	NODE 23	MX	-.109868-02	MY	.368341-03	MX	.702107-03
114	CENTROID	SX	.417834+01	SY	.419599+01	SX	.519819+01
		VX	.304502-03	VY	-.334467-02		
	NODE 24	MX	.149729-02	MY	.248336-02	MX	.470843-03
	NODE 75	MX	.764897-02	MY	.815023-02	MX	.340642-03
	NODE 77	MX	.136051-03	MY	-.280888-02	MX	.587504-03
115	CENTROID	SX	.120954+02	SY	-.205635+01	SX	-.109407+02
		VX	.155308-03	VY	-.722895-03		
	NODE 39	MX	-.257593-02	MY	-.455492-02	MX	.741942-04
	NODE 24	MX	-.337661-03	MY	-.209933-02	MX	.105476-02
	NODE 77	MX	-.230676-03	MY	-.191514-02	MX	.501137-03
116	CENTROID	SX	-.512634+01	SY	-.736205+01	SX	-.589130+01
		VX	-.126777-03	VY	.133324-02		
	NODE 24	MX	-.144119-02	MY	.319461-02	MX	.108892-02
	NODE 39	MX	-.119479-02	MY	-.322211-02	MX	-.143069-03
	NODE 25	MX	.755589-03	MY	.159926-03	MX	.472924-03
117	CENTROID	SX	-.505956+01	SY	-.715968+01	SX	.538999+01
		VX	-.831810-04	VY	-.463226-03		
	NODE 39	MX	-.714138-03	MY	-.175471-02	MX	-.143068-03
	NODE 26	MX	.138130-04	MY	-.306012-03	MX	-.999457-03
	NODE 25	MX	.464262-03	MY	-.247794-04	MX	-.371263-03
118	CENTROID	SX	-.190111+01	SY	.116766+01	SX	.840723+01
		VX	.170014-03	VY	.593334-02		
	NODE 26	MX	-.129786-02	MY	-.235265-02	MX	-.525836-03
	NODE 39	MX	-.750239-02	MY	-.855727-02	MX	.854175-04
	NODE 79	MX	.359166-02	MY	.507668-02	MX	.214052-03
119	CENTROID	SX	.203088+00	SY	.115465+02	SX	.442620+01
		VX	.251284-03	VY	-.126920-02		
	NODE 81	MX	.476451-03	MY	.673868-03	MX	-.203877-03
	NODE 26	MX	-.290272-03	MY	.105200-04	MX	-.366389-03

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DATE 073000

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CENTROID	SIX	SVY	SVY	SXV	
MODE 47	VXX	-.252921+01	-.720840+00	.153401+01	
NODE 87		-.529222-04	-.144002-03		
NODE 48	MXX	-.908584-04	-.256385-03	MXV	-.189363-03
	MXX	-.999156-04	-.327188-03	MYV	-.507634-04
	MXX	-.378496-03	-.717022-03	MYV	-.181790-03

LOADING - DNAG

RESULTANT JOINT LOADS - SUPPORTS

JOINT	FORCES			MOMENTS		
	X FORCE	Y FORCE	Z FORCE	X MOMENT	Y MOMENT	Z MOMENT
101	.012	.000	-.017	-.001	.000	.000
102	-.000	.000	-.000	.000	.000	.000
103	-.103	.000	-.012	.000	.000	.000
104	.000	.000	-.011	.000	.000	.000
105	.002	.000	.039	.000	.000	.000
106	-.001	.000	.016	.000	.000	.000
107	-.100	.000	.003	.000	.000	.000
108	-.001	.000	-.009	.000	.000	.000
109	-.000	.000	-.020	.000	.000	.000
110	-.000	.000	.023	.000	.000	.000
111	-.001	.000	-.002	.000	.000	.000
112	.002	.000	.002	.000	.000	.000
113	-.002	.000	.001	.000	.000	.000
114	-.002	.000	.001	.000	.000	.000
115	-.002	.000	.001	.000	.000	.000
116	.000	.000	.001	.000	.000	.000
117	.000	.000	.001	.000	.000	.000
118	.000	.000	.001	.000	.000	.000
119	.000	.000	.000	.000	.000	.000
120	.000	.000	-.003	.000	.000	.000
121	.000	.000	.001	.000	.000	.000
122	.000	.000	-.021	.000	.000	.000
123	.000	.000	-.020	.000	.000	.000
124	.000	.000	-.050	.000	.000	.000
125	.000	.000	-.012	.000	.000	.000
126	.000	.000	.005	.000	.000	.000
127	.000	.000	-.019	.000	.000	.000
128	.000	.000	.001	.000	.000	.000
129	.000	.000	.007	.000	.000	.000
130	.000	.000	.001	.000	.000	.000
131	.000	.000	.000	.000	.000	.000
132	.000	.000	-.001	.000	.000	.000
133	.000	.000	-.015	.000	.000	.000
134	.000	.000	.002	.000	.000	.000
135	.000	.000	-.017	.000	.000	.000
136	.000	.000	-.001	.000	.000	.000
137	.000	.000	-.003	.000	.000	.000
138	.000	.000	.002	.000	.000	.000
139	.000	.000	.016	.000	.000	.000
140	.000	.000	-.035	.004	.000	.000
141	.000	.000	-.026	.004	.000	.000
142	.000	.000	-.035	.003	.000	.000
143	.000	.000	-.007	.002	.000	.000
144	.000	.000	-.020	.003	.000	.000
145	.000	.000	-.018	.003	.000	.000
146	.000	.000	-.007	.003	.000	.000

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146	GL0	.000	-.009	-.036	.002	.000	-.008
147	GL0	.000	.000	.006	.000	.000	-.000
148	GL0	.000	.000	.005	.000	.000	.000
149	GL0	.000	.000	.002	.000	.000	.000
150	GL0	.000	.000	.030	.000	.000	.000
151	GL0	.000	.000	.001	.000	.000	.000
152	GL0	.000	.000	-.009	.000	.000	-.000
153	GL0	.000	.000	-.000	.000	.000	-.000
154	GL0	.000	.000	.001	.000	.000	.000
TOTALS		-.000	-.091	-.344	.024	.000	.001

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	DISPLACEMENTS			ROTATIONS		
	X DISPL	Y DISPL	Z DISPL	X ROT	Y ROT	Z ROT
101	.000	.000	.000	.000	.000	.000
102	.000	.000	.000	.000	.000	.000
103	.000	.000	.000	.000	.000	.000
104	.000	.000	.000	.000	.000	.000
105	.000	.000	.000	.000	.000	.000
106	.000	.000	.000	.000	.000	.000
107	.000	.000	.000	.000	.000	.000
108	.000	.000	.000	.000	.000	.000
109	.000	.000	.000	.000	.000	.000
110	.000	.000	.000	.000	.000	.000
111	.000	.000	.000	.000	.000	.000
112	.000	.000	.000	.000	.000	.000
113	.000	.000	.000	.000	.000	.000
114	.000	.000	.000	.000	.000	.000
115	.000	.000	.000	.000	.000	.000
116	.000	.000	.000	.000	.000	.000
117	.000	.000	.000	.000	.000	.000
118	.000	.000	.000	.000	.000	.000
119	.000	.000	.000	.000	.000	.000
120	.000	.000	.000	.000	.000	.000
121	.000	.000	.000	.000	.000	.000
122	.000	.000	.000	.000	.000	.000
123	.000	.000	.000	.000	.000	.000
124	.000	.000	.000	.000	.000	.000
125	.000	.000	.000	.000	.000	.000
126	.000	.000	.000	.000	.000	.000
127	.000	.000	.000	.000	.000	.000
128	.000	.000	.000	.000	.000	.000
129	.000	.000	.000	.000	.000	.000
130	.000	.000	.000	.000	.000	.000
131	.000	.000	.000	.000	.000	.000
132	.000	.000	.000	.000	.000	.000
133	.000	.000	.000	.000	.000	.000
134	.000	.000	.000	.000	.000	.000
135	.000	.000	.000	.000	.000	.000
136	.000	.000	.000	.000	.000	.000
137	.000	.000	.000	.000	.000	.000
138	.000	.000	.000	.000	.000	.000

SUMMARY

A STRESS ANALYSIS WAS PERFORMED ON THE ANTENNA ADAPTER MOUNT (649-2848-001) UNDER WHAT WAS CONSIDERED A WORST CASE AERODYNAMIC LOADING CONDITION OF THE ANTENNA. THE ANALYSIS OF THE CASTING SHOWS THAT IT IS OF SUFFICIENT STRENGTH TO CARRY ALL INDUCED LOADS WITH THE FOLLOWING MARGINS-OF-SAFETY (CASTING FACTOR OF 2.0 INCLUDED):

MS (CASTING TENSILE YIELD) = +2.24

MS (CASTING SHEAR ULT) = +11.2

MS (ATTACHMENT BOLTS TENSION) = +30.4

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 95

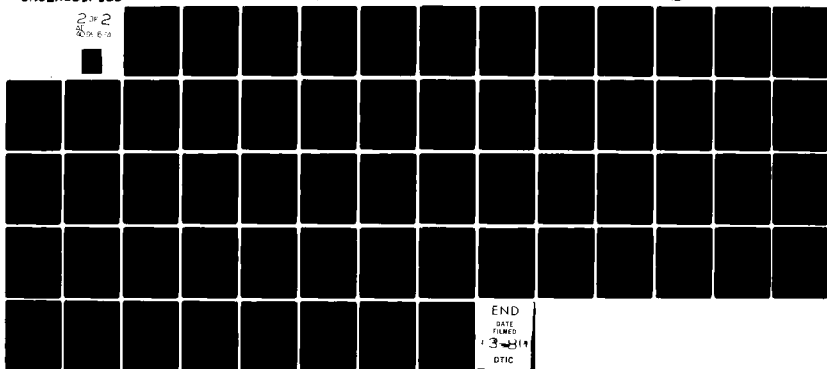
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ROCKWELL INTERNATIONAL DALLAS TEX COLLINS RADIO GROUP F/G 1/3
STRESS ANALYSIS OF AIRCRAFT MODIFICATIONS (C-141B AIRCRAFT). JO--ETC(U)
OCT 80 D B RAGAN F09603-80-C-0602

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2 2
2 2
2 2



END

DATE

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APPENDICES

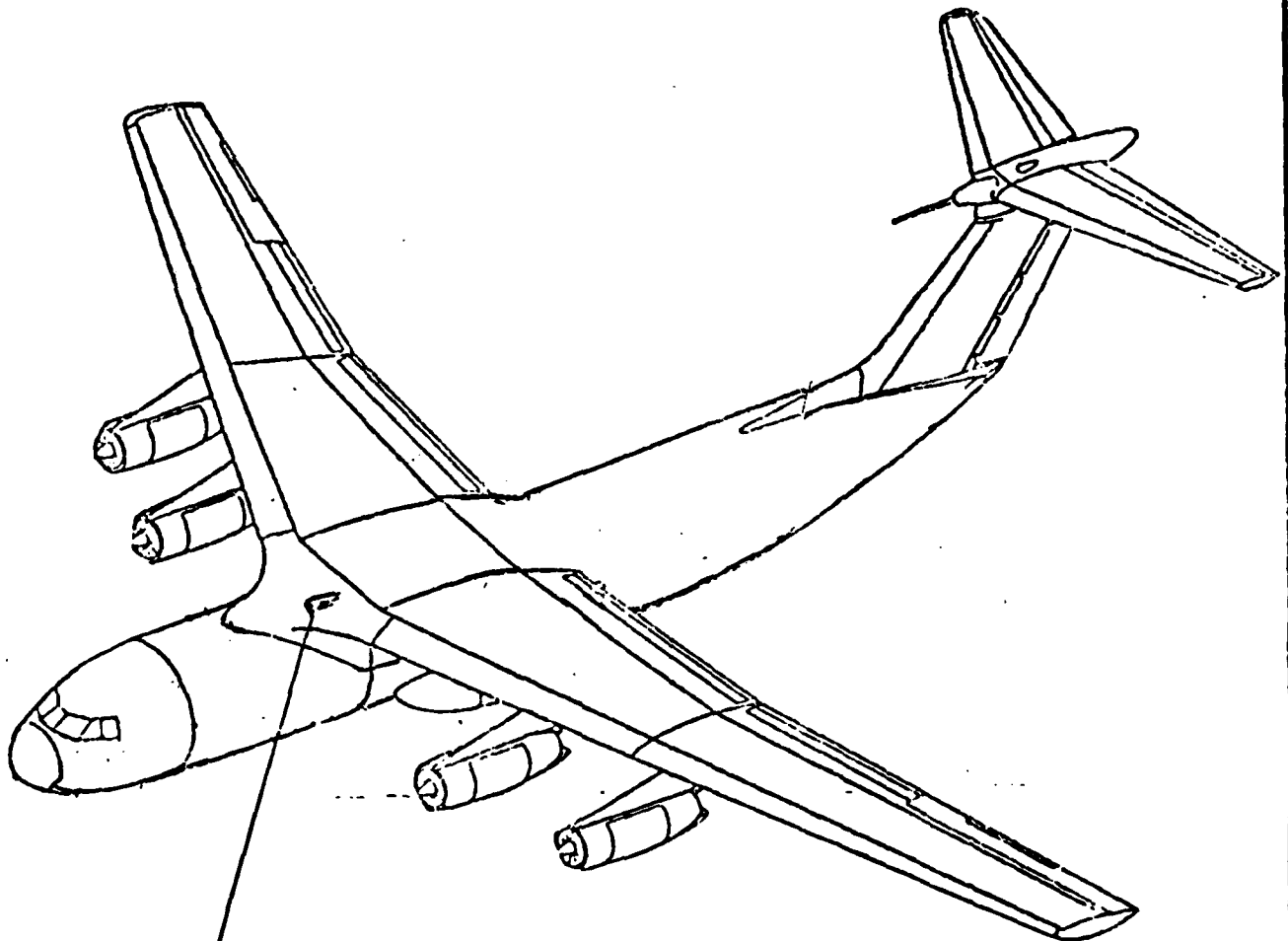
A	AERODYNAMIC LOADING CALCULATIONS
B	LISTING OF COMPUTER RESULTS

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET 96

'C141-B' 'DM C34-3/B UHF ANTENNA MOD'

*
* ICES STRUDL-II *
* THE STRUCTURAL DESIGN LANGUAGE *
*
* CIVIL ENGINEERING SYSTEMS LABORATORY *
* MASSACHUSETTS INSTITUTE OF TECHNOLOGY *
* CAMBRIDGE, MASSACHUSETTS *
*
* 17.14.36 22 AUG 80 *
*
* UNIVAC 1100 SERIES EXEC 8 *
* VERSION 2.7 *
*

PREPARED BY MAARTEN VET



LOCATION OF ANTENNA

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 97

1.0 INTRODUCTION

A STRESS ANALYSIS WILL BE PERFORMED ON THE ADAPTER CASTING WHICH IS THE TRANSITION BETWEEN THE DM C34-3/B UHF ANTENNA AND THE FUSELAGE OF THE C141-B AIRCRAFT. THE ADAPTER WAS ADDED TO COMPENSATE FOR THE 7-DEGREE FORWARD SLOPE OF THE FUSELAGE; THUS THE ANTENNA WILL FLY WITH A ZERO ANGLE OF ATTACK. THE LOADINGS TO BE CONSIDERED ARE THE AERODYNAMIC FORCES INDUCED DUE TO EITHER THE MAXIMUM PERMISSIBLE VELOCITY OF 380 KNOTS AT SEA LEVEL OR MACH 0.85 ABOVE 23,000 FEET ALTITUDE; WHICHEVER PRESENTS THE WORST CASE CONDITION. HOWEVER, TO ENSURE THAT A CONSERVATIVE ANALYSIS IS PRESENTED, THE AERODYNAMIC FORCES WILL BE CALCULATED FOR AN ARBITRARY 10-DEGREE ANGLE OF ATTACK; SUCH AS MANY BE ENCOUNTERED DURING TAKEOFF OR SHARP MANUEVERING IN FLIGHT.

THE CASTING WILL BE MODELED USING TRIANGULAR PLATE ELEMENTS FOR THE BASIC CASTING WALLS AND TRIDIMENSIONAL ELEMENTS FOR THE HOLD-DOWN BOSSES. THE CASTING MATERIAL IS ALUMINUM ALLOY A356-T6.

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 98

2.0--LOCATION OF THE NODE POINTS

UNITS INCHES, DEGREES

2.1--LOWER SLOPING PLANE

NODE COORDINATES

X Y Z

1	-1.06	+0.00	-.13
2	-0.75	-1.31	-.09
3	00.00	-2.25	0.00
4	00.94	-2.88	0.12
5	02.06	-3.50	0.25
6	02.76	-3.50	0.34
7	03.76	-3.50	0.46
8	05.58	-3.50	0.69
9	06.58	-3.50	0.81
10	09.38	-3.50	1.15
11	12.00	-3.50	1.47
12	13.00	-3.50	1.60
13	14.63	-3.50	1.80
14	15.63	-3.50	1.92
15	18.56	-3.50	2.28
16	19.31	-3.00	2.37
17	20.25	-2.38	2.49
18	21.25	-1.31	2.61
19	21.56	+0.00	2.65
20	09.38	-2.63	1.15
21	09.38	+0.00	1.15
22	-0.75	+1.31	-.09
23	00.00	+2.25	0.00
24	00.94	+2.88	0.12
25	02.06	+3.50	0.25
26	02.76	+3.50	0.34
27	03.76	+3.50	0.46
28	05.58	+3.50	0.69
29	06.58	+3.50	0.81
30	09.38	+3.50	1.15
31	12.00	+3.50	1.47
32	13.00	+3.50	1.60
33	14.63	+3.50	1.80
34	15.63	+3.50	1.92
35	16.56	+3.50	2.28
36	19.31	+3.00	2.37
37	20.25	+2.38	2.49
38	21.25	+1.31	2.61
39	09.38	+2.63	1.15
40	00.50	-1.50	0.06
41	01.38	-2.13	0.17
42	02.76	-2.63	0.34
43	03.76	-2.63	0.46

44	05.58	-2.63	0.69
45	06.58	-2.63	0.81
46	12.00	-2.63	1.47
47	13.00	-2.63	1.60
48	14.63	-2.63	1.80
49	15.63	-2.63	1.92
50	18.88	-2.25	2.32
51	19.75	-1.69	2.42
52	00.50	+1.50	0.06
53	01.38	+2.13	0.17
54	02.76	+2.63	0.34
55	03.76	+2.63	0.46
56	05.58	+2.63	0.69
57	06.58	+2.63	0.81
58	12.00	+2.63	1.47
59	13.00	+2.63	1.60
60	14.63	+2.63	1.80
61	15.63	+2.63	1.92
62	18.88	+2.25	2.32
63	19.75	+1.69	2.42

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 100

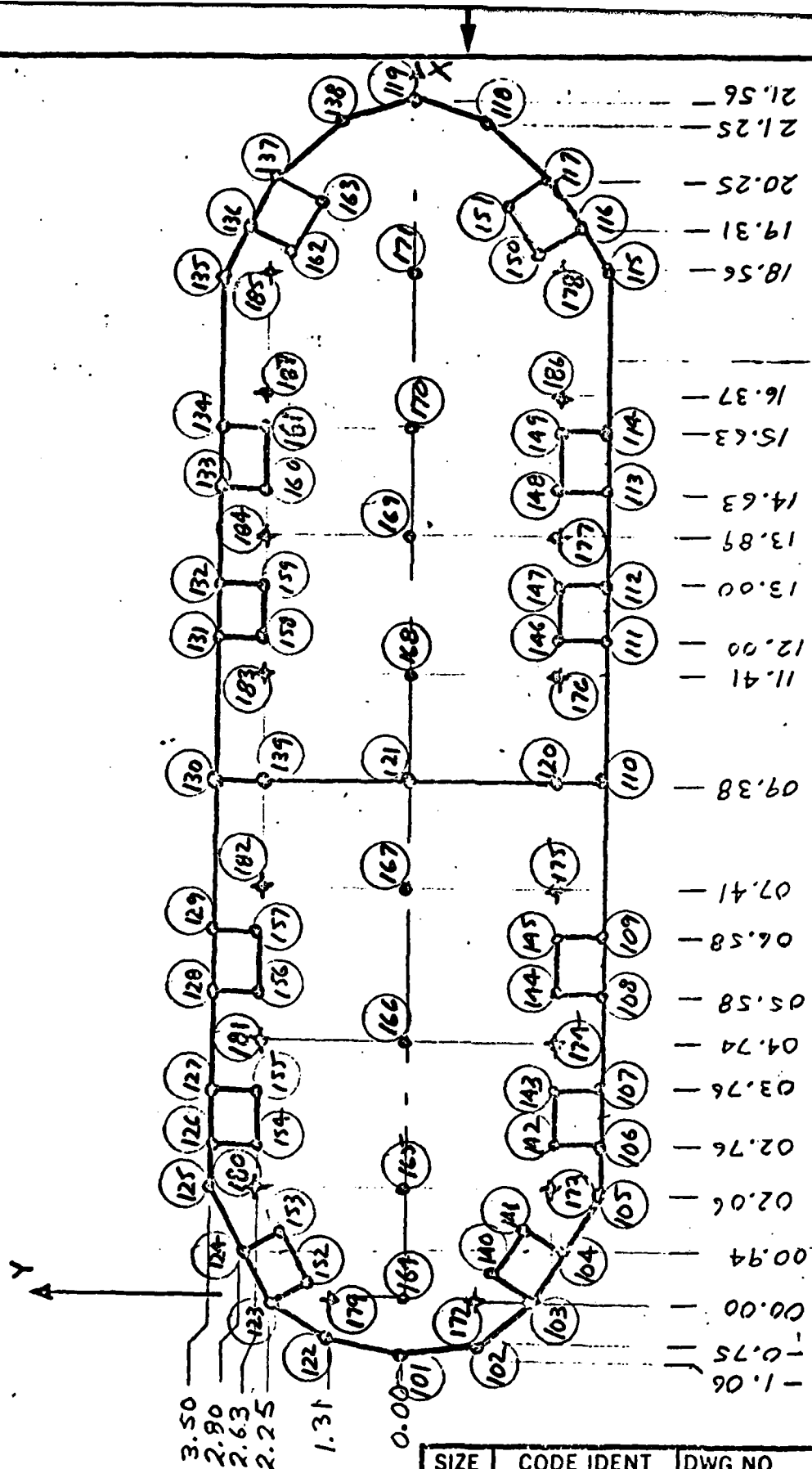
2.2--UPPER PLANE

NODE COORDINATES

	X	Y	Z
101	-1.06	+0.00	3.20
102	-0.75	-1.31	3.20
103	00.00	-2.25	3.20
104	00.94	-2.88	3.20
105	02.06	-3.50	3.20
106	02.76	-3.50	3.20
107	03.76	-3.50	3.20
108	05.58	-3.50	3.20
109	06.58	-3.50	3.20
110	09.58	-3.50	3.20
111	12.00	-3.50	3.20
112	13.00	-3.50	3.20
113	14.63	-3.50	3.20
114	15.63	-3.50	3.20
115	18.56	-3.50	3.20
116	19.31	-3.00	3.20
117	20.25	-2.36	3.20
118	21.25	-1.31	3.20
119	21.56	+0.00	3.20
120	09.58	-2.63	3.20
121	09.58	+0.00	3.20
122	-0.75	+1.31	3.20
123	00.00	+2.25	3.20
124	00.94	+2.88	3.20
125	02.06	+3.50	3.20
126	02.76	+3.50	3.20
127	03.76	+3.50	3.20
128	05.58	+3.50	3.20
129	06.58	+3.50	3.20
130	09.58	+3.50	3.20
131	12.00	+3.50	3.20
132	13.00	+3.50	3.20
133	14.63	+3.50	3.20
134	15.63	+3.50	3.20
135	16.56	+3.50	3.20
136	19.31	+3.00	3.20
137	20.25	+2.38	3.20
138	21.25	+1.31	3.20
139	09.58	+2.63	3.20
140	00.50	-1.50	3.20
141	01.58	-2.13	3.20
142	02.76	-2.63	3.20
143	03.76	-2.63	3.20
144	05.58	-2.63	3.20
145	06.58	-2.63	3.20
146	12.00	-2.63	3.20
147	13.00	-2.63	3.20
148	14.63	-2.63	3.20
149	15.63	-2.63	3.20

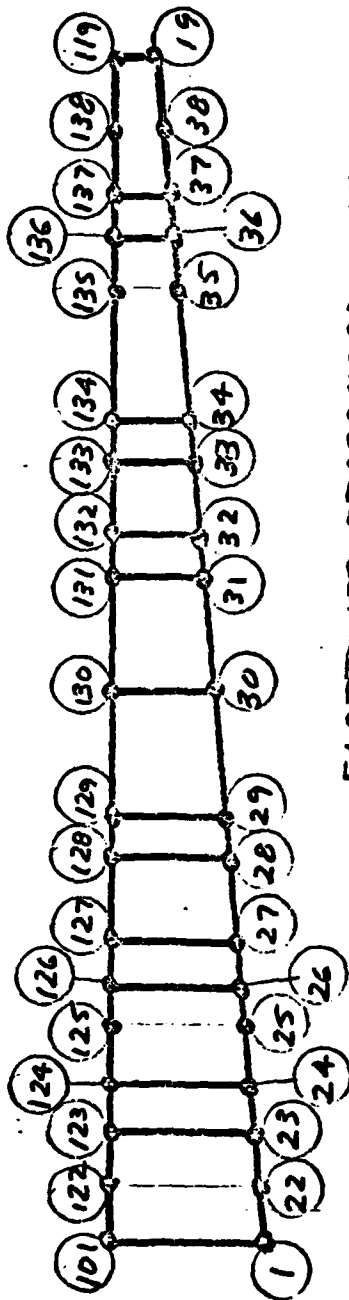
150	18.88	-2.25	3.20
151	19.75	-1.69	3.20
152	00.50	+1.50	3.20
153	01.58	+2.13	3.20
154	02.76	+2.63	3.20
155	03.76	+2.63	3.20
156	05.58	+2.63	3.20
157	06.58	+2.63	3.20
158	12.00	+2.63	3.20
159	13.00	+2.63	3.20
160	14.63	+2.63	3.20
161	15.63	+2.63	3.20
162	18.88	+2.25	3.20
163	19.75	+1.69	3.20
165	02.06	+0.00	3.20
164	00.00	+0.00	3.20
166	04.74	+0.00	3.20
167	07.41	+0.00	3.20
168	11.41	+0.00	3.20
169	13.89	+0.00	3.20
170	15.63	+0.00	3.20
171	18.56	+0.00	3.20
172	00.00	-1.31	3.20
173	02.06	-2.63	3.20
174	04.74	-2.63	3.20
175	07.41	-2.63	3.20
176	11.41	-2.63	3.20
177	13.89	-2.63	3.20
178	18.56	-2.63	3.20
179	00.00	+1.31	3.20
180	02.06	+2.63	3.20
181	04.74	+2.63	3.20
182	07.41	+2.63	3.20
183	11.41	+2.63	3.20
184	13.89	+2.63	3.20
185	18.56	+2.63	3.20
186	16.37	-2.63	3.20
187	16.37	+2.63	3.20

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 102

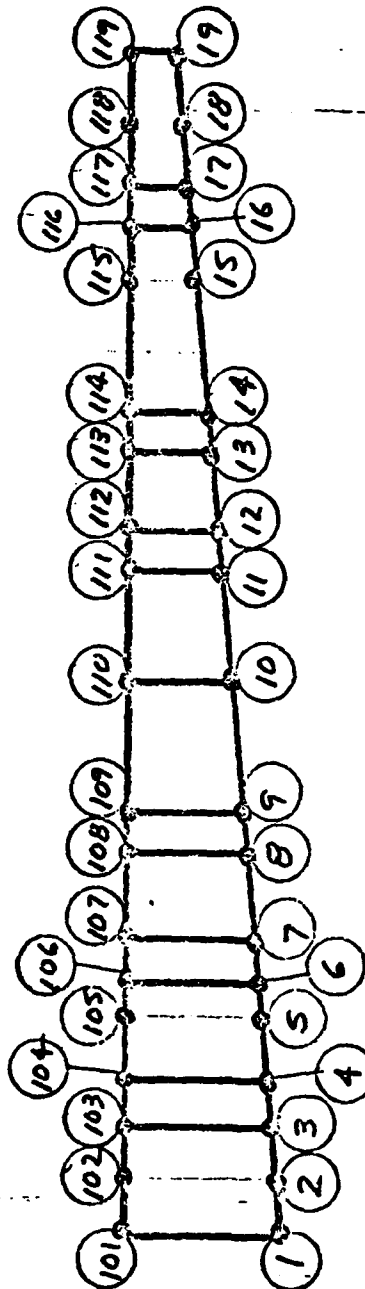


UPPER HORIZ. PLANE

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 103



FLATTENED STARBOARD SIDE



FLATTENED PORT SIDE

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 104

2.3--SUPPORT. NODES

NODE COORDINATES

	X	Y	Z	
220	09.58	-2.63	0.15	SUPPORT
221	09.58	+0.00	0.15	SUPPORT
239	09.58	+2.63	0.15	SUPPORT
240	00.50	-1.50	-.94	SUPPORT
241	01.58	-2.13	-.83	SUPPORT
242	02.76	-2.63	-.66	SUPPORT
243	03.76	-2.63	-.54	SUPPORT
244	05.58	-2.63	-.31	SUPPORT
245	06.58	-2.63	-.19	SUPPORT
246	12.00	-2.63	0.47	SUPPORT
247	13.00	-2.63	0.60	SUPPORT
248	14.63	-2.63	0.80	SUPPORT
249	15.63	-2.63	0.92	SUPPORT
250	18.88	-2.25	1.32	SUPPORT
251	19.75	-1.69	1.42	SUPPORT
252	00.50	+1.50	-.94	SUPPORT
253	01.58	+2.13	-.83	SUPPORT
254	02.76	+2.63	-.66	SUPPORT
255	03.76	+2.63	-.54	SUPPORT
256	05.58	+2.63	-.31	SUPPORT
257	06.58	+2.63	-.19	SUPPORT
258	12.00	+2.63	0.47	SUPPORT
259	13.00	+2.63	0.60	SUPPORT
260	14.63	+2.63	0.80	SUPPORT
261	15.63	+2.63	0.92	SUPPORT
262	18.88	+2.25	1.32	SUPPORT
263	19.75	+1.69	1.42	SUPPORT

NODE RELEASES

220,239	FORCE	Y
240 TO 263	FORCE	Y

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 105

3.0--LOCATION OF THE FINITE ELEMENTS

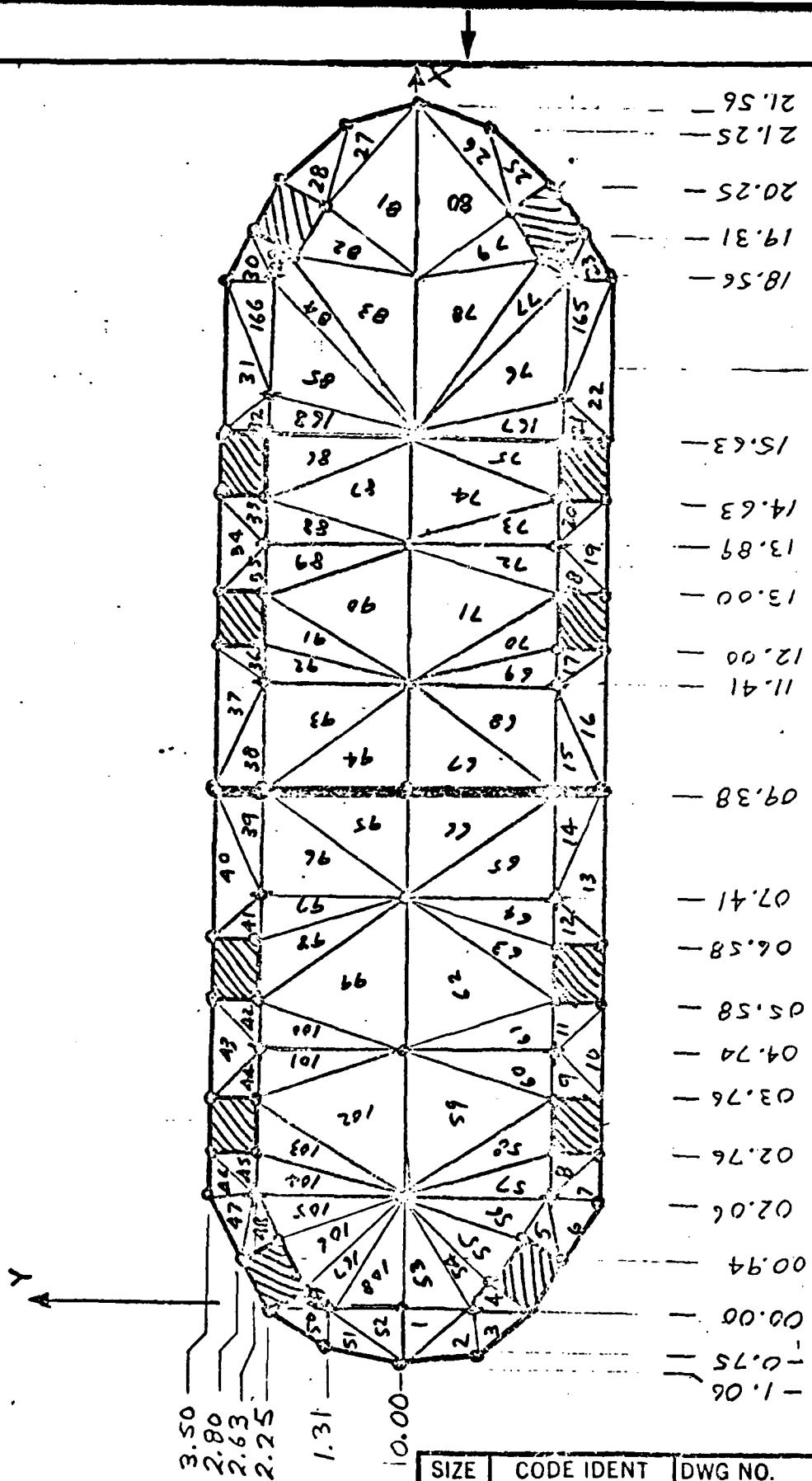
3.1--UPPER HORIZONTAL SURFACE

TYPE BENDING

ELEMENT INCIDENCES

1	101	172	164
2	172	101	102
3	102	103	172
4	172	103	140
5	104	173	141
6	173	104	105
7	106	173	105
8	173	106	142
9	107	174	143
10	107	108	174
11	174	108	144
12	109	175	145
13	109	110	175
14	175	110	120
15	110	176	120
16	110	111	176
17	176	111	146
18	112	177	147
19	112	113	177
20	177	113	148
21	114	186	149
22	114	115	186
165	186	115	178
23	115	116	178
24	178	116	150
25	118	151	117
26	119	151	118
27	163	119	138
28	138	137	163
29	136	185	162
30	185	136	135
31	135	134	187
32	187	134	161
166	135	187	185
33	133	184	160
34	133	132	184
35	184	132	159
36	131	183	158
37	131	130	183
38	183	130	139
39	130	182	139
40	130	129	157
41	182	129	157
42	128	181	156

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET 106



SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 107

43 128 127 181
 44 181 127 155
 45 126 180 154
 46 180 126 125
 47 125 124 180
 48 180 124 153
 49 123 179 152
 50 123 122 179
 51 101 179 122
 52 179 101 164
 53 172 165 164
 54 165 172 140
 55 141 165 140
 56 173 165 141
 57 142 165 173
 58 143 165 142
 59 165 143 166
 60 166 143 174
 61 144 166 174
 62 144 167 166
 63 167 144 145
 64 167 145 175
 65 120 167 175
 66 167 120 121
 67 120 168 121
 68 168 120 176
 69 146 168 176
 70 147 168 146
 71 168 147 169
 72 169 147 177
 73 148 169 177
 74 169 148 170
 75 170 148 149
 167 186 170 149
 76 178 170 186
 77 170 178 150

78 170 150 171
 79 171 150 151
 80 119 171 151
 81 171 119 163
 82 162 171 163
 83 162 170 171
 84 170 162 185
 85 170 185 187
 168 170 187 161
 86 160 170 161
 87 170 160 169
 88 169 160 184
 89 159 169 184
 90 159 168 169
 91 168 159 158
 92 168 158 183
 93 139 168 183
 94 168 139 131
 95 139 167 121
 96 167 139 182
 97 157 167 182
 98 156 167 157
 99 167 156 166
 100 166 156 181
 101 155 166 156
 102 155 165 166
 103 165 155 154
 104 165 154 180
 105 165 180 153
 106 152 165 153
 107 165 152 179
 108 165 179 164

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001	
SCALE		REV	SHEET 108

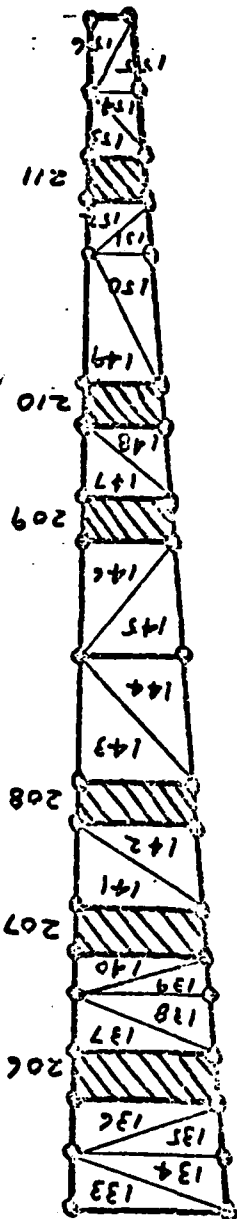
3.2--VERTICAL SIDE ELEMENTS

TYPE BENDING

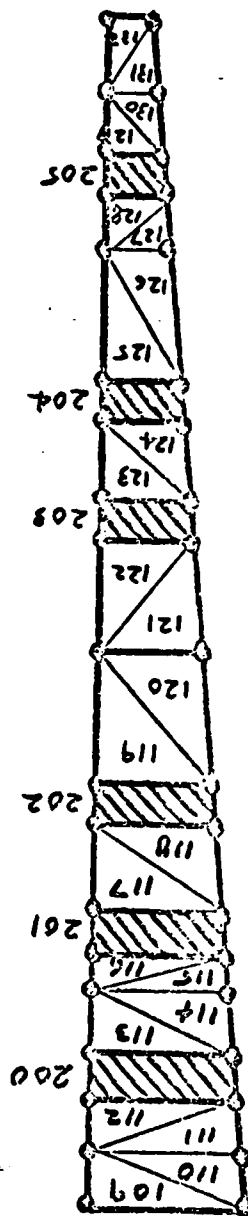
ELEMENT INCIDENCES

109	1	102	101	133	1	122	101
110	102	1	2	134	122	1	22
111	3	102	2	135	23	122	22
112	102	3	103	136	122	23	123
113	4	105	104	137	24	125	124
114	105	4	5	138	125	24	25
115	6	105	5	139	26	125	25
116	105	6	106	140	125	26	126
117	7	108	107	141	27	128	127
118	108	7	8	142	128	27	28
119	9	110	109	143	29	130	129
120	110	9	10	144	130	29	30
121	11	110	10	145	31	130	30
122	110	11	111	146	130	31	131
123	12	113	112	147	32	133	132
124	113	12	13	148	133	32	33
125	14	115	114	149	34	135	134
126	115	14	15	150	135	34	35
127	16	115	15	151	36	135	35
128	115	16	116	152	135	36	136
129	17	118	117	153	37	138	137
130	118	17	18	154	138	37	38
131	19	118	18	155	19	138	38
132	118	19	119	156	138	19	119

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 109



FLATTENED STARBOARD SIDE



FLATTENED PORT SIDE

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 110

3.3--CAST BOSSES

TYPE TRIDIMENSIONAL

ELEMENT INCIDENCES

200	3	4	104	103	40	41	141	140
201	6	7	107	106	42	43	143	142
202	8	9	109	108	44	45	145	144
203	11	12	112	111	46	47	147	146
204	13	14	114	113	48	49	149	148
205	16	17	117	116	50	51	151	150
206	52	53	153	152	23	24	124	123
207	54	55	155	154	26	27	127	126
208	56	57	157	156	28	29	129	128
209	58	59	159	158	31	32	132	131
210	60	61	161	160	33	34	134	133
211	62	63	163	162	36	37	137	136

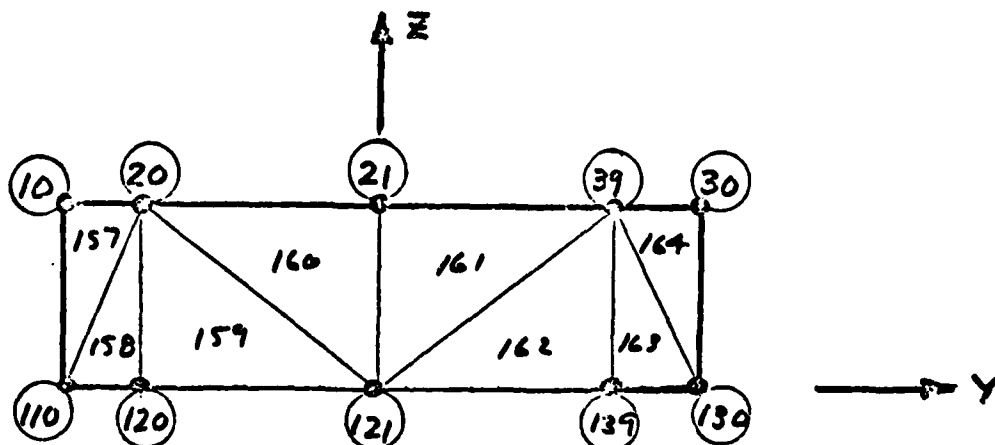
SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 111

3.4--TRANSVERSE RIB

TYPE BENDING

ELEMENT INCIDENCES

157	110	20	10
158	20	110	120
159	121	20	120
160	20	121	21
161	121	39	21
162	39	121	139
163	130	39	139
164	39	130	30



-- TRANSVERSE RIB --

(X = 09.38)

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 112

3.5--SUPPORT MEMBERS

TYPE SPACE FRAME

MEMBER INCIDENCES

300	220	20
301	221	21
302	239	39
303	240	40
304	241	41
305	242	42
306	243	43
307	244	44
308	245	45
309	246	46
310	247	47
311	248	48
312	249	49
313	250	50
314	251	51
315	252	52
316	253	53
317	254	54
318	255	55
319	256	56
320	257	57
321	258	58
322	259	59
323	260	60
324	261	61
325	262	62
326	263	63

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET 113

3.6--DUMMY FRAMING MEMBERS

IN ORDER TO HAVE COMPATIBILITY OF DEGREES-OF-FREEDOM AT ALL THE
NODE POINTS, THIN DUMMY MEMBERS WILL BE USED TO MAKE UP A VIRTUAL FRAME
HAVING INSIGNIFICANT STIFFNESS.

TYPE SPACE FRAME

MEMBER INCIDENCES

400	1	2					
401	2	3		437	101	102	
402	3	4		438	102	103	
403	4	5		439	103	104	
404	5	6		440	104	105	473 1 101
405	6	7		441	105	106	474 2 102
406	7	8		442	106	107	475 5 105
407	8	9		443	107	108	476 10 110
408	9	10		444	108	109	477 15 115
409	10	11		445	109	110	478 18 118
410	11	12		446	110	111	479 19 119
411	12	13		447	111	112	480 22 122
412	13	14		448	112	113	481 25 125
413	14	15		449	113	114	482 30 130
414	NOT USED			450	114	115	483 35 135
415	15	16		451	115	116	484 38 138
416	16	17		452	116	117	
417	17	18		453	117	118	
418	18	19		454	118	119	
419	1	22		455	101	122	
420	22	23		456	122	123	
421	23	24		457	123	124	
422	24	25		458	124	125	
423	25	26		459	125	126	
424	26	27		460	126	127	
425	27	28		461	127	128	
426	28	29		462	128	129	
427	29	30		463	129	130	
428	30	31		464	130	131	
429	31	32		465	131	132	
430	32	33		466	132	133	
431	33	34		467	133	134	
432	34	35		468	134	135	
433	35	36		469	135	136	
434	36	37		470	136	137	
435	37	38		471	137	138	
436	38	29		472	138	119	

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 114

4.0--PROPERTIES OF THE STRUCTURAL COMPONENTS

<u>ELEMENT</u>	<u>PROPERTIES</u>
1 TO 108	TYPE 'SBCT' THICKNESS .190
109 TO 114	TYPE 'SBCT' THICKNESS .375
115 TO 120	TYPE 'SBCT' THICKNESS .190
129 TO 132	TYPE 'SBCT' THICKNESS 1.25
133 TO 138	TYPE 'SBCT' THICKNESS .375
139 TO 152	TYPE 'SBCT' THICKNESS .190
153 TO 156	TYPE 'SBCT' THICKNESS 1.25
157 TO 164	TYPE 'SBCT' THICKNESS 1.00
165 TO 168	TYPE 'SBCT' THICKNESS .190
200 TO 211	TYPE 'IPLSCSH'

<u>MEMBER</u>	<u>PROPERTIES</u>
300 TO 326	AX .0228 IX .0002 IY .0001 SY .0007 IZ .0001 SZ .0007
400 TO 413	AX .0361 IX .0002 IY .0001 IZ .0001
415 TO 484	AX .0361 IX .0002 IY .0001 IZ .0001

CONSTANTS

E	1.00E7	ALL
G	3.80E6	ALL
POISSON	.33	ALL
E	2.90E7	300 TO 326
G	1.20E7	300 TO 326
POISSON	.50	300 TO 326

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 115

5.0--LOADING OF THE CASTING STRUCTURE

THE LOADING TO BE APPLIED IS FOR THE SEA LEVEL FLIGHT AT THE MAXIMUM VELOCITY OF 380-KNOTS. THIS CONDITION RESULTS IN THE WORST-CASE DYNAMIC LOADING.

DRAG FORCE 90.90-LB.
LIFT FORCE 338.0-LB.
MOMENT 2360 IN.-LB.

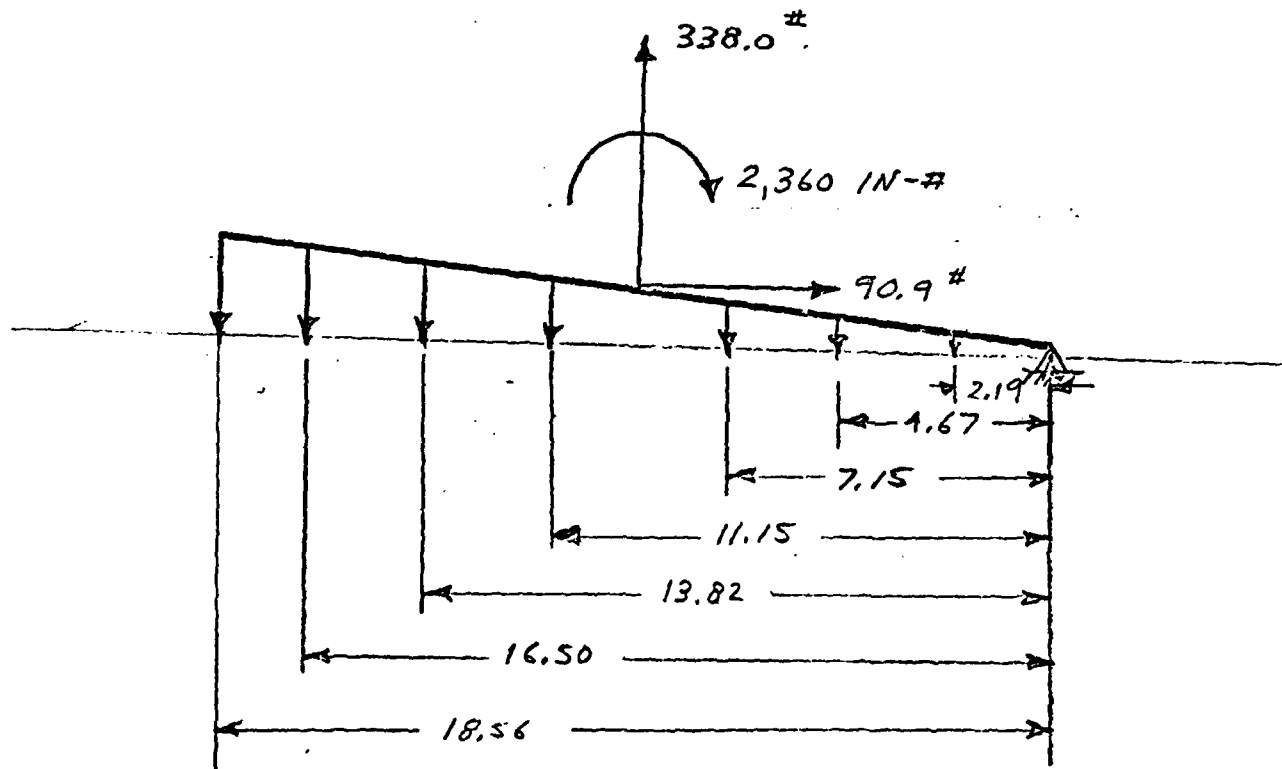
LOADING 'DRAG'

NODE	LOADS			
172.179	FORCE X	+5.68	FORCE Z	+42.82
173.180	FORCE X	+5.68	FORCE Z	+40.41
174.181	FORCE X	+5.68	FORCE Z	+37.28
175.182	FORCE X	+5.68	FORCE Z	+34.16
176.183	FORCE X	+5.68	FORCE Z	+29.49
177.184	FORCE X	+5.68	FORCE Z	+26.59
186.187	FORCE X	+5.68	FORCE Z	+23.69
178.185	FORCE X	+5.68	FORCE Z	-65.44

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 116

ANTENNA ATTACHMENT LOADS *

ASSUMPTION: THE ANTENNA STIFFNESS IS OF SUCH MAGNITUDE THAT THE ANTENNA TENDS TO ROTATE AS A RIGID BODY ABOUT ITS AFT EDGE. — — — — —



LIFT LOADING

EACH NODE $F_z = + \frac{338.0}{16} = + 21.13$

DRAW LOADING

EACH NODE $F_x = + \frac{90.9}{16} = + 5.68$

* SEE APPENDIX 'A'
FOR LOAD CALCS.

SIZE	CODE IDENT	DWG NO.
A	134.99	649-2924-001
SCALE	REV	SHEET 117

MOMENT LOADING

$$M_R = \frac{2F}{18.56} \left[(18.56)^2 + (16.50)^2 + (13.82)^2 + (11.15)^2 + (7.15)^2 + (4.67)^2 + (2.19)^2 \right]$$

$$= 108.81 F$$

$$F = \frac{2360}{108.81} = +21.69$$

SUMMATION

NODES 172, 179 FORCE X = +5.68

$$\text{FORCE Z} = +21.13 + 21.69 = +42.82$$

NODES 173, 180 FORCE X = +5.68

$$\text{FORCE Z} = +21.13 + \left(\frac{16.50}{18.56} \right) (21.69) = +40.41$$

NODES 174, 181 FORCE X = +5.68

$$\text{FORCE Z} = +21.13 + \left(\frac{13.82}{18.56} \right) (21.69) = +37.28$$

NODES 175, 182 FORCE X = +5.68

$$\text{FORCE Z} = +21.13 + \left(\frac{11.15}{18.56} \right) (21.69) = +34.16$$

NODES 176, 183 FORCE X = +5.68

$$\text{FORCE Z} = +21.13 + \left(\frac{7.15}{18.56} \right) (21.69) = +29.49$$

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 118

NODES 177, 184 FORCE X = +5.68

$$\text{FORCE Z} = +21.13 + \left(\frac{4.67}{18.56} \right) (21.69) = +26.59$$

NODES 186, 187 FORCE X = +5.68

$$\text{FORCE Z} = +21.13 + \left(\frac{2.19}{18.56} \right) (21.69) = +23.69$$

NODES 178, 185 FORCE X = +5.68

$$\text{FORCE Z} = -234.44 + \frac{338.0}{2}$$

$$= -65.44$$

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET 119

6.0--MISC. ANALYSIS AND EXECUTION STATEMENTS

STIFFNESS ANALYSIS REDUCE BAND ROOT

UNITS KIPS

OUTPUT DECIMAL 3

LIST FORCES, REACTIONS, STRESSES ALL

FINISH

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET 120

7.0 - RESULTS OF THE COMPUTER ANALYSIS

7.1 - STRESSES IN THE FINITE ELEMENTS

7.1.1 - UPPER HORIZ. SURFACE

MAX. SHEAR STRESS = 23.5-PSI IN EZ. 25

MAX. DIRECT STRESS = 16.7-PSI IN EZ. 24

MAX. BEND. MOMENT = 20.4 IN-LB/IN IN EZ. 44

MAX. BENDING STRESS

$$S_B = \frac{6M}{t^2}$$
$$= \frac{(6)(20.4)}{(0.190)^2} = 3,391 \text{ - PSI}$$

7.1.2 - VERTICAL SURFACE

MAX. SHEAR STRESS = 51.1-PSI IN EZ. 127

MAX. DIRECT STRESS = 132.0-PSI IN EZ. 128

MAX. BEND. MOMENT = 4.12 IN-LB/IN IN EZ 134

= 3.12 IN-LB/IN IN EZ 126

= 8.83 IN-LB/IN IN EZ 156

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 121

$$\text{MAX. BENDING STRESS} = \frac{(6)(1.12)}{(0.375)^2} = 176 \text{ -PSI}$$

$$= \frac{(6)(3.12)}{(0.190)^2} = 519 \text{ -PSI}$$

$$= \frac{(6)(8.83)}{(1.25)^2} = 34 \text{ -PSI}$$

7.1.3- TRANSVERSE RIB

$$\text{MAX. SHEAR STRESS} = 5.5 \text{ -PSI IN EL. 164}$$

$$\text{MAX. DIRECT STRESS} = 10.8 \text{ -PSI IN EL. 157}$$

$$\text{MAX. BEND. MOMENT} = 10.1 \text{ IN-LB/IN IN EL. 169}$$

$$\text{MAX. BENDING STRESS} = \frac{(6)(10.1)}{(1.00)^2} = 61 \text{ -PSI}$$

7.1.4- HOLD-DOWN BOSSES

$$\text{MAX. SHEAR STRESS} = 903.7 \text{ -PSI IN EL. 205}$$

$$\text{MAX. DIRECT STRESS} = 857.0 \text{ -PSI IN EL. 211}$$

7.1.5 - MARGINS - OF - SAFETY

AL CASTING ALLOY A356-T6
PER 94-A-601

A CASTING FACTOR OF 2.0 WILL BE USED

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET 122

FROM MIL-HDBK-5C, TABLE 3.13.5.0(b)

ASSUMING THE LOWEST CLASS CASTING

$$F_{TY} = 22\text{-KSI}$$

$$F_{SU} = 22\text{-KSI}$$

$$M.S. (TENS. YLD) = \frac{22,000}{(2.0)(3,391)} - 1.0 = + 2.24$$

$$M.S. (SHEAR ULT) = \frac{22,000}{(2.0)(903.7)} - 1.0 = + 11.2$$

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET 123

7.2- ATTACHMENT BOLT LOADS

RESULTANT JOINT LOADS - SUPPORTS

JOINT		FORCES		
		X FORCE	Y FORCE	Z FORCE
220	GLO	-.010	.000	-.007
221	GLO	-.009	-.000	-.007
239	GLO	-.011	.000	-.007
240	GLO	-.001	.000	-.038
241	GLO	-.002	.000	-.034
242	GLO	-.003	.000	-.028
243	GLO	-.003	.000	-.016
244	GLO	-.003	.000	-.028
245	GLO	-.003	.000	-.012
246	GLO	-.001	.000	-.022
247	GLO	-.001	.000	-.010
248	GLO	-.002	.000	-.015
249	GLO	-.002	.000	-.007
250	GLO	-.004	.000	.050
251	GLO	-.005	.000	.002
252	GLO	-.001	.000	-.037
253	GLO	-.002	.000	-.033
254	GLO	-.003	.000	-.028
255	GLO	-.003	.000	-.015
256	GLO	-.003	.000	-.028
257	GLO	-.003	.000	-.015
258	GLO	-.002	.000	-.021
259	GLO	-.002	.000	-.010
260	GLO	-.002	.000	-.016
261	GLO	-.002	.000	-.006
262	GLO	-.004	.000	.054
263	GLO	-.005	.000	-.003
TOTALS		-.091	-.000	-.338

FROM THE ANALYTICAL MODEL IT CAN BE SEEN
THAT TWO NODES AT EACH BOSS REPRESENT
THE TIE-DOWN ARRANGEMENT.

$$\text{MAX. TENSION} = 38 + 34 = 72\text{-LB}$$

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 124

AN 3 BOLTS (10-32)

$$\left. \begin{array}{l} P_S = 2126\text{-LB} \\ P_T = 2259\text{-LB} \end{array} \right\} \text{MIL-HDBK-5C, TABLES 8.1.5(a) \& (b)}$$

SINCE THE SHEAR IS INSIGNIFIKANT, INTERACTION EQUATIONS WILL NOT BE USED.

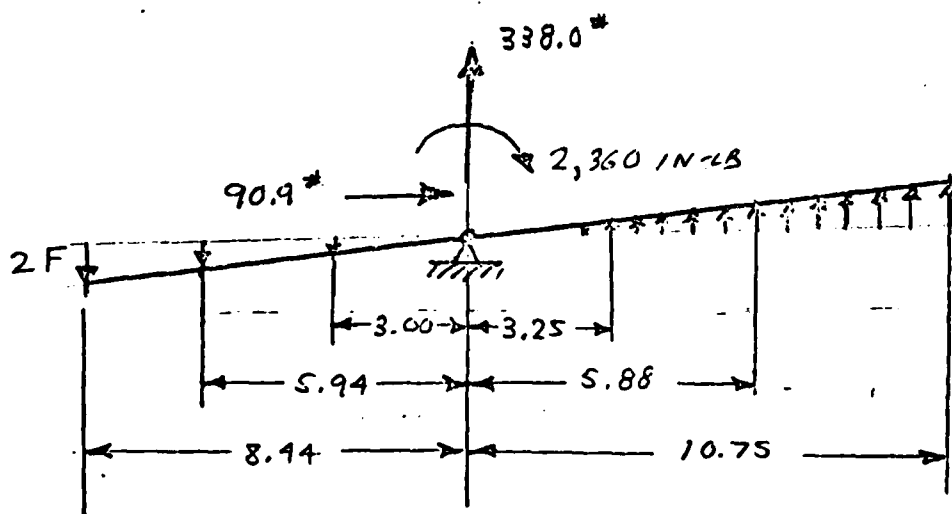
$$\text{M.S. (TENS. ULT)} = \frac{2259}{72} - 1.0 = + 30.4$$

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET 125

8.0 - FORCES INDUCED INTO THE AIRCRAFT

8.1 - ASSUMPTIONS

- DUE TO THE STIFFNESS OF THE ANTENNA BAYONET, IN COMPARISON TO THE BENDING STIFFNESS OF THE HONEYCOMB PANEL; THE BASE OF THE ANTENNA WILL TEND TO ROTATE AS A RIGID BODY.
- BECAUSE OF THE STIFFNESS OF THE TRANSVERSE A/C STIFFENER, IN COMPARISON TO THE HONEYCOMB PANEL STIFFNESS; THE ANTENNA WILL ROTATE ABOUT THE STIFFENER AND THE ATTACHMENTS TO THE STIFFENER WILL TAKE OUT ALMOST ALL OF THE LIFT FORCE.
- THE AERODYNAMIC FORCES FOR THE WORST-CASE SEA LEVEL FLIGHT WILL CREATE THE MORE SEVERE LOADING CONDITION.



SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET 126

8.2 - REACTION TO THE MOMENT

IN REALITY, THE AFT END OF THE ANTENNA LOADS THE PANEZ IN COMPRESSION WITH SOME FORM OF DISTRIBUTED LOADING; PERHAPS TRIANGULAR IN NATURE. THE PROBLEM IS AN INDETERMINATE ONE WHOSE SOLUTION WILL REQUIRE A KNOWLEDGE OF ATTACHMENT BOLT AND PANEZ SPRING RATES. TO SIMPLIFY THE SOLUTION, ASSUME EACH PORTION OF THE A/C PANEZ ON EACH SIDE OF THE PIVOT LINE REACTS ONE-HALF OF THE MOMENT.

$$2 \left[\frac{F}{8.44} \left(\overline{8.14}^2 + \overline{5.94}^2 + \overline{3.00}^2 \right) \right] = \frac{1}{2} (2360)$$

$$F = 43.11\text{-LB TENSION}$$

8.3 - REACTION TO THE FORCES

ASSUME ALL THE LIFT FORCES IS TAKEN IN THE ATTACHMENTS AT THE TRANSVERSE STIFFENER.

$$F = \frac{1}{3} (338.0) = 112.7\text{-LB TENSION}$$

ASSUME ONLY ONE-HALF OF THE ATTACHMENTS TAKE OUT THE DRAG FORCE

$$F = \frac{1}{6} (90.9) = 15.2\text{-LB SHEAR}$$

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET 127

APPENDIX A

AERODYNAMIC LOADING CALCULATIONS

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET A-1

A.0- AERODYNAMIC CALCULATIONS

A.1- MAXIMUM DYNAMIC PRESSURE

REFERENCE: T.O. 1C-141A-1, ~~FIGURE 5-8.~~

- MAX. PERMISSIBLE VELOCITY ABOVE 23,000-FT. ALTITUDE IS $M=0.85$
- MAX PERMISSIBLE VELOCITY BELOW 23,000-FT. ALTITUDE IS 380-KNOTS

A.1.1 - AT 23,000-FT ALTITUDE

$$C = 1025 - \text{FT/SEC}$$

$$\rho = .002378 \left(\frac{P}{P_0} \right) \left(\frac{T_0}{T} \right)$$

$$= (.002378)(.1046) \left(\frac{1}{.8419} \right) = .001143 \text{ LB-SEC}^2/\text{FT}^3$$

$$v = (1025)(.85) = 871 \text{ FT/SEC}$$

$$q_{\infty} = \frac{1}{2} \rho v^2$$

$$= \frac{1}{2} (.001143)(871)^2 = 434 - \text{LB/FT}^2$$

A.1.2- AT SEA LEVEL

$$C = 1117 - \text{FT/SEC}$$

$$\rho = .002378 \text{ LB-SEC}^2/\text{FT}^3$$

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET A-2

$$V = (380)(1.689) \\ = 642 \text{ FT/SEC} \quad (M = .57)$$

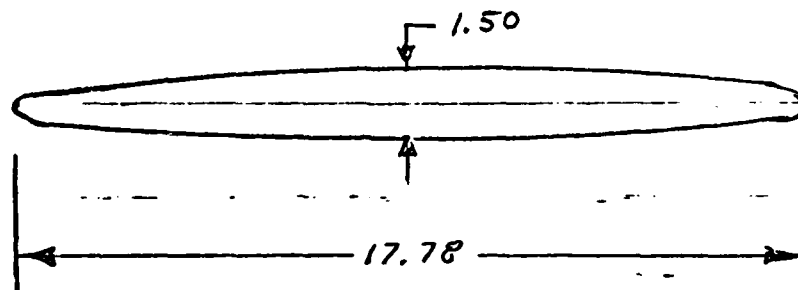
$$q_{\infty} = \frac{1}{2} (0.002378)(642)^2 = 496 - \text{LB/FT}^2$$

A.2-DRAG & LIFT FORCES

ASSUMPTIONS:

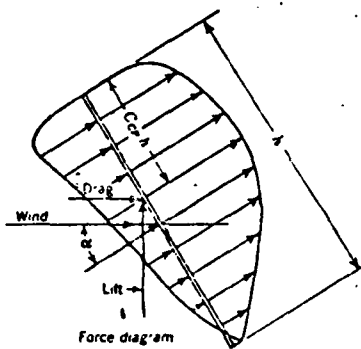
- AS A WORST-CASE, ASSUME THAT THE ANGLE-OF-ATTACK ON THE ANTENNA IS 10° .
- THE SAUCER PORTION OF THE ANTENNA WILL BE TREATED AS A FLAT DISC, RATHER THAN AS AN AIRFOIL.
- THE ENTIRE ANTENNA IS OUTSIDE THE BOUNDARY LAYER. (CONSERVATIVE)

A.2.1 - SAUCER



$$AREA = \frac{\pi}{4} \left(\frac{17.78}{12} \right)^2 = 1.724 - \text{FT}^2$$

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET A-3



(d) INCLINED PLATE

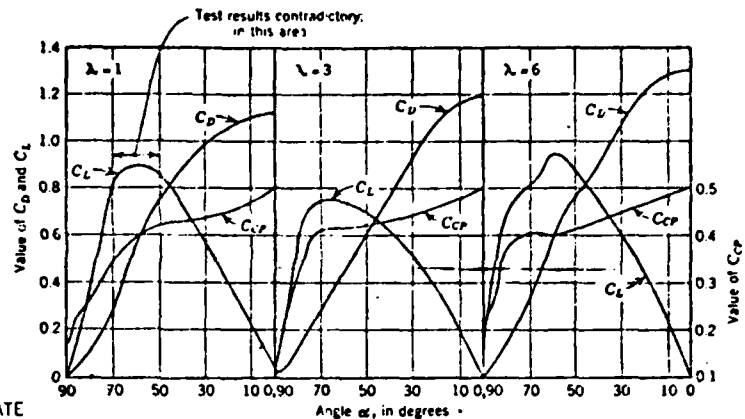


FIG. 5.—WIND PRESSURES ON ELEMENTARY BODIES

(FROM ASCE PAPER 3269)

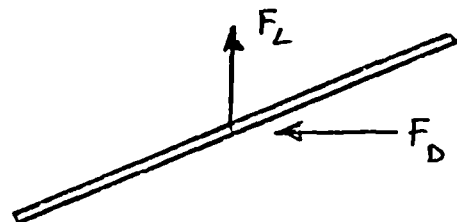
FOR $\lambda = 1$ (A SQUARE PLATE) THE DRAG COEFFICIENT IS ALMOST THE SAME AS FOR A CIRCULAR PLATE OF THE SAME AREA.

FROM THE CURVES ABOVE (FOR $\lambda = 1$), AT $\alpha = 80^\circ$:

$$C_D = .10$$

$$C_L = .40$$

$$C_{cp} = .26$$



(a) AT 23,000-FT ALTITUDE

$$F_D = C_D A g_{oo}$$

$$= (.10)(1.724)(434) = 74.8 \text{ -LB.}$$

$$F_L = C_L A g_{oo}$$

$$= (.40)(1.724)(434) = 299.3 \text{ -LB.}$$

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET A-4

$$\bar{X} = C_{cp} D = (.26)(17.78) = 4.62 - \text{IN. FROM TOP OF DISC}$$

(b) AT SEA LEVEL

$$F_D = (.10)(1.724)(490) = 84.5 - \text{LB.}$$

$$F_L = (.40)(1.724)(490) = 338.0 - \text{LB.}$$

A.2.2 - BAYONET

REFERENCE: DORNE & MARGOLIN ENGR. REPORT NO.
7051.15, "DM C34-3 ANTENNA
AERODYNAMIC ANALYSIS".

$$A_{REF} = 1.237 - \text{FT}^2.$$

(a) AT 23,000-FT ALTITUDE

$$C_D = .06683$$

$$F_D = (.06683)(1.237)(494) = 35.9 - \text{LB}$$

(b) AT SEA LEVEL

$$C_D \approx \frac{1}{2} (.00983 + .01133) = .01058$$

$$F_D = (.01058)(1.237)(490) = 6.4 - \text{LB.}$$

SIZE	CODE IDENT	DWG NO.
A	13499	649-2924-001
SCALE	REV	SHEET A-5

A.2.3 - TOTAL ANTENNA

REFERENCE: DORNE & MARGOLIN DRAWING
261D1195, "DM C34-3/B UHF
ANTENNA".

$$\bar{Y}_{\text{SAUCER}} \approx 10.48\text{-IN.}$$

$$\bar{Y}_{\text{BATONET}} \approx 4.86\text{-IN.}$$

AT 23,000-FT ALTITUDE

$$F_D = 74.8 + 35.9 = 110.7\text{-LB}$$

$$F_L = 299.3\text{-LB}$$

$$M = (74.8)(10.48) + (35.9)(4.86) + (299.3)(4.27) \\ = 2,236\text{ IN-LB.}$$

AT SEA LEVEL

$$F_D = 84.5 + 6.4 = 90.9\text{-LB.}$$

$$F_L = 338.0\text{-LB}$$

$$M = (84.5)(10.48) + (6.4)(4.86) + (338.0)(4.27) \\ = 2,360\text{ IN-LB.}$$

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET A-6

APPENDIX B

LISTING OF COMPUTER RESULTS

SIZE A	CODE IDENT 13499	DWG NO. 649-2924-001
SCALE	REV	SHEET B-1

UNIVAC 1100 SERIES ICES

RESULTS OF LATEST ANALYSIS

PROBLEM - CIVIL-8 TITLE - DM C34-3/8 UHF ANTENNA MOD

ACTIVE UNITS INC.: KIPS DEGREE DEGF SECOND

ACTIVE STRUCTURE TYPE SPACE FRAME

ACTIVE COORDINATE AXES X Y Z

LOADING - DRAG

ELEMENT STRESSES

ELEMENT

1	CENTROID	SXX	.648678-03	SYX	-.111939-02	SXY	-.410492-01
	NUDE 101	VXX	.555519-02	VYX	-.279333-02		
	NUDE 172		-.251269-02		MYX	-.160105-05	
	NUDE 164		.502916-02		MYX	-.342179-03	
			.157451-02		MYX	-.799224-03	
2	CENTROID	SXX	.100470-01	SYX	-.137625-02	SXY	-.278003-02
	NUDE 172	VXX	.238524-01	VYX	.450716-03		
	NUDE 101		.109900-01		MYX	-.107211-02	
	NUDE 102		.112955-02		MYX	-.331267-04	
			-.649240-02		MYX	-.951904-03	
3	CENTROID	SXX	.858124-02	SYX	-.581796-02	SXY	-.992172-02
	NUDE 102	VXX	.209484-01	VYX	-.140134-02		
	NUDE 103		-.816495-02		MYX	-.107311-02	
	NUDE 172		-.636324-03		MYX	-.283340-03	
			.795865-02		MYX	-.678226-03	
4	CENTROID	SXX	-.164612-01	SYX	-.140820-01	SXY	-.284481-02
	NUDE 172	VXX	-.194430-01	VYX	.145232-01		
	NUDE 103		.917520-02		MYX	-.283340-03	
	NUDE 140		.193635-02		MYX	-.283340-03	
			-.317827-02		MYX	.197313-02	
5	CENTROID	SXX	-.525953-02	SYX	-.113095-01	SXY	-.278564-02
	NUDE 104	VXX	.911468-02	VYX	-.607861-02		
	NUDE 173		.141519-02		MYX	-.416552-03	
			.120653-02		MYX	-.447796-03	

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NUDE 141	MAX	-.282193-02	MYT	-.145334-02	MAX	.116711-02
CENIROID	SXX	-.333394-02	SVT	.462546-02	SXX	.158166-02
NUDE 104	VXX	-.507564-03	VYT	.112334-01		
NUDE 105	MAX	-.199412-02	MYT	-.226179-02	MAX	-.390123-03
NUDE 173	MAX	-.494676-02	MYT	-.513355-02	MAX	-.329394-03
	MAX	.422562-02	MYT	.573291-02	MAX	-.537294-03
CENIROID	SXX	-.270738-02	SVT	.483223-02	SXX	.288409-01
NUDE 106	VXX	.898434-02	VYT	.777008-02		
NUDE 175	MAX	.302173-02	MYT	.286862-02	MAX	.115087-03
NUDE 105	MAX	.618350-02	MYT	.622729-02	MAX	-.329399-03
	MAX	-.591769-02	MYT	-.516126-02	MAX	-.107156-03
CENIROID	SXX	-.235114-01	SVT	-.218898-01	SXX	.795759-02
NUDE 173	VXX	-.142867-01	VYT	-.114722-02		
NUDE 106	MAX	.791766-02	MYT	.788307-02	MAX	-.155336-03
NUDE 142	MAX	.232170-02	MYT	.196495-02	MAX	.579755-03
	MAX	-.363727-02	MYT	-.168531-02	MAX	.212210-03
CENIROID	SXX	.140964-02	SVT	-.915153-02	SXX	.113456-01
NUDE 107	VXX	.113734-01	VYT	-.465935-02		
NUDE 174	MAX	.564235-02	MYT	.234410-02	MAX	.288135-03
NUDE 143	MAX	.930385-02	MYT	.805237-02	MAX	.922025-04
	MAX	-.546468-02	MYT	-.367841-02	MAX	.190169-03
CENIROID	SXX	-.937787-02	SVT	-.106086-01	SXX	.150084-01
NUDE 107	VXX	-.379003-03	VYT	.530170-02		
NUDE 108	MAX	-.137436-02	MYT	-.258874-02	MAX	-.641007-04
NUDE 174	MAX	-.114905-02	MYT	-.250396-02	MAX	-.641007-04
	MAX	.447425-02	MYT	.358913-02	MAX	-.603789-04
CENIROID	SXX	-.112607-01	SVT	-.242689-01	SXX	.108843-01
NUDE 174	VXX	-.143156-01	VYT	-.789418-03		
NUDE 108	MAX	.930523-02	MYT	.795636-02	MAX	-.158178-03
NUDE 144	MAX	.233315-02	MYT	.994012-03	MAX	-.288864-03
	MAX	-.446895-02	MYT	-.216436-02	MAX	-.219531-03
CENIROID	SXX	.168672-01	SVT	-.115410-01	SXX	.961422-02
NUDE 109	VXX	.163569-01	VYT	-.644832-02		
NUDE 175	MAX	.445215-02	MYT	.396172-02	MAX	.341465-03
NUDE 145	MAX	.961325-02	MYT	.914066-02	MAX	.527756-03
	MAX	-.707404-02	MYT	-.513767-02	MAX	.434610-03
CENIROID	SXX	.143574-01	SVT	-.934165-03	SXX	.726370-02
NUDE 109	VXX	.177541-04	VYT	.605601-02		
NUDE 110	MAX	-.144887-02	MYT	-.195021-02	MAX	.117264-03
NUDE 175	MAX	-.469462-02	MYT	-.445359-02	MAX	.117263-03
	MAX	.517422-02	MYT	.435524-02	MAX	-.333361-03

14	CENTROID	SXX	.769637-02	SYT	.121765-02	SXY	.171112-02
	NUDE 175	VXX	.834417-03	VTY	-.403353-02		
	NUDE 110	MXX	-.04727-02	MTY	.642360-02	MXV	-.828116-04
	NUDE 120	MXX	.101644-02	MTY	.609499-03	MXV	.362510-04
		MXX	-.470249-02	MTY	-.239497-02	MXV	-.232712-04
15	CENTROID	SXX	.246837-01	SYT	.682346-02	SXY	.418504-02
	NUDE 110	VXX	-.113198-02	VTY	-.360759-02		
	NUDE 176	MXX	.166495-02	MTY	.829877-03	MXV	.362510-04
	NUDE 120	MXX	.544970-02	MTY	.486780-02	MXV	-.105529-03
		MXX	-.352778-02	MTY	-.208504-02	MXV	-.351356-04
16	CENTROID	SXX	.103844-01	SYT	-.607199-02	SXY	.145128-01
	NUDE 110	VXX	-.811628-03	VTY	.377826-02		
	NUDE 111	MXX	-.318496-02	MTY	-.345768-02	MXV	-.279452-03
	NUDE 176	MXX	-.203856-03	MTY	-.119202-02	MXV	-.279452-03
		MXX	.569111-02	MTY	.291726-02	MXV	.932804-04
17	CENTROID	SXX	.109996-01	SYT	-.246732-01	SXY	.561047-02
	NUDE 176	VXX	-.198637-01	VTY	.114514-02		
	NUDE 111	MXX	.770498-02	MTY	.760984-02	MXV	-.521817-03
	NUDE 146	MXX	.254456-02	MTY	.201726-02	MXV	-.217754-03
		MXX	-.486098-02	MTY	-.244416-02	MXV	-.369785-03
18	CENTROID	SXX	.247644-01	SYT	-.656585-02	SXY	.210069-02
	NUDE 112	VXX	.946916-02	VTY	-.999032-03		
	NUDE 177	MXX	.157100-02	MTY	.830589-03	MXV	.525041-08
	NUDE 147	MXX	.688768-02	MTY	.565519-02	MXV	-.123646-03
		MXX	-.350504-02	MTY	-.163684-02	MXV	-.355710-04
19	CENTROID	SXX	.632824-02	SYT	-.634047-02	SXY	.694901-02
	NUDE 112	VXX	.347680-03	VTY	.296656-02		
	NUDE 113	MXX	-.840256-03	MTY	-.156716-02	MXV	-.244674-03
	NUDE 177	MXX	.141592-03	MTY	-.734224-03	MXV	-.244684-03
		MXX	.517470-02	MTY	.233550-02	MXV	-.404469-04
20	CENTROID	SXX	.101472-01	SYT	-.169947-01	SXY	.409399-02
	NUDE 177	VXX	-.121863-01	VTY	-.257385-03		
	NUDE 113	MXX	.658010-02	MTY	.371557-02	MXV	-.279420-03
	NUDE 146	MXX	.210275-02	MTY	.129645-02	MXV	-.458502-03
		MXX	-.218251-02	MTY	-.159545-02	MXV	-.368961-03
21	CENTROID	SXX	.119345-01	SYT	-.112894-01	SXY	-.605702-02
	NUDE 114	VXX	.989752-02	VTY	.382253-02		
	NUDE 186	MXX	-.800674-03	MTY	-.703636-03	MXV	.265699-03
	NUDE 149	MXX	.501815-02	MTY	.567299-02	MXV	.150318-03
		MXX	-.154286-02	MTY	.142152-02	MXV	.208014-03

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22	CENIM010	SKX VXX	-.104707-01 SYV .112616-02 VYY -.217375-02 VYY -.256401-02 VYY .373144-02 VYY	-.487637-02 SKY .501604-02 -.202625-02 -.253707-02 .371474-02	SKY MXV MXV MXV MXV	-.429826-02 .436209-03 .436209-03 .351043-03
165	CENIM010	SKX VXX	.246665-02 SYV .834529-02 VYY .571656-02 VYY .918401-02 VYY -.636347-02 VYY	.590285-02 SKY -.180086-01 .446405-02 .654870-02 -.875512-02	SKY MXV MXV MXV MXV	.555078-02 -.167512-03 -.619756-03 -.4935849-03
23	CENIM010	SKX VXX	-.318291-01 SYV .638881-02 VYY .479914-02 VYY .311575-02 VYY -.599378-02 VYY	-.541475-02 SKY -.938485-02 .510169-02 .275307-02 -.871977-02	SKY MXV MXV MXV MXV	-.219263-01 -.819786-03 -.215048-04 -.111178-02
24	CENIM010	SKX VXX	-.202608-01 SYV .108226-01 VYY .272839-02 VYY .915507-02 VYY -.519282-02 VYY	.466680-01 SKY .308518-01 .202323-02 .948321-02 -.661181-02	SKY MXV MXV MXV MXV	-.172568-01 -.244875-03 -.112712-02 -.227910-02
25	CENIM010	SKX VXX	-.219299-01 SYV .252261-02 VYY -.142673-02 VYY -.233284-02 VYY .383629-03 VYY	-.581385-01 SKY -.163265-02 -.132809-02 -.172418-02 .744553-03	SKY MXV MXV MXV MXV	.234945-01 .346494-03 .208410-03 .253310-03
26	CENIM010	SKX VXX	.103718-01 SYV -.785367-04 VYY -.680783-03 VYY -.282165-03 VYY -.350945-03 VYY	.832647-02 SKY -.247116-05 -.224213-03 -.153006-03 -.813357-04	SKY MXV MXV MXV MXV	.279352-02 .995472-04 .255311-03 .177010-03
27	CENIM010	SKX VXX	.126325-01 SYV .176105-03 VYY -.635469-03 VYY -.776016-03 VYY -.545494-03 VYY	.763570-02 SKY .276330-05 -.176250-03 -.246226-03 -.771068-04	SKY MXV MXV MXV MXV	-.383177-02 -.279011-03 -.129188-03 -.205091-03
28	CENIM010	SKX VXX	-.102295-01 SYV .116048-02 VYY -.138816-02 VYY -.760379-03 VYY -.468109-03 VYY	-.456130-01 SKY .865269-03 -.140365-02 -.677501-03 -.357241-03	SKY MXV MXV MXV MXV	-.153343-01 -.420893-03 -.359425-03 -.156013-03

29	CENIROID	SXX	-.220058-01	SVY	.421730-01	SXX	.117337-01
	NUDE 162	VXX	.131622-01	VYV	-.398200-01	MYV	-.196327-03
	NUDE 136		.909866-02		.108665-01	MYV	-.064593-03
	NUDE 165		.294113-02		.392859-02	MYV	.109473-02
			-.905825-02		-.693666-02	MYV	
30	CENIROID	SXX	-.666423-02	SVY	.312867-01	SXX	.262591-03
	NUDE 136	VXX	.668361-02	VYV	.173393-01	MYV	-.213366-03
	NUDE 135		.181146-02		.179812-02	MYV	-.378814-03
	NUDE 165		.477499-02		.388178-02	MYV	-.119420-03
			-.952246-02		-.984743-02	MYV	
31	CENIROID	SXX	.152266-01	SVY	-.398758-02	SXX	.619522-02
	NUDE 139	VXX	.209155-02	VYV	-.271303-02	MYV	.477624-04
	NUDE 147		-.303195-03		-.704123-03	MYV	.158452-03
	NUDE 135		.307215-02		.265525-02	MYV	-.138754-03
			.254744-02		-.3593137-04	MYV	
32	CENIROID	SXX	.152799-01	SVY	-.853882-02	SXX	.467318-02
	NUDE 187	VXX	.632165-02	VYV	-.192722-02	MYV	.119138-03
	NUDE 134		.520579-02		.478166-02	MYV	.632584-04
	NUDE 161		.603110-03		.197144-03	MYV	.911980-04
			-.134186-02		.613775-03	MYV	
166	CENIROID	SXX	-.153890-02	SVY	-.107649-01	SXX	.953072-02
	NUDE 187	VXX	.199501-01	VYV	-.170399-02	MYV	.561481-03
	NUDE 185		.274262-03		.159487-02	MYV	.561481-03
	NUDE 135		-.806244-02		-.720308-02	MYV	-.124166-02
			.625347-02		.172237-02	MYV	
33	CENIROID	SXX	.897574-02	SVY	-.193703-01	SXX	-.341696-01
	NUDE 133	VXX	-.120883-01	VYV	.100633-02	MYV	.335688-03
	NUDE 184		.229739-02		.146255-02	MYV	.309118-03
	NUDE 160		.650983-02		.566631-02	MYV	.322153-03
			-.337796-02		-.207025-02	MYV	
34	CENIROID	SXX	.338154-02	SVY	-.774595-02	SXX	-.834825-02
	NUDE 133	VXX	.179583-03	VYV	-.306657-02	MYV	.211397-03
	NUDE 132		-.215007-03		-.109026-02	MYV	.211397-03
	NUDE 184		-.100831-02		-.173550-02	MYV	.573156-04
			.300556-02		.217583-02	MYV	
35	CENIROID	SXX	.232049-01	SVY	-.689478-02	SXX	-.291326-01
	NUDE 184	VXX	.936950-02	VYV	.193771-02	MYV	.109130-03
	NUDE 132		.632085-02		.558904-02	MYV	.165182-04
	NUDE 159		.193187-02		.117582-02	MYV	.630193-04
			-.369606-02		-.212483-02	MYV	
36	CENIROID	SXX	.633567-02	SVY	-.209454-01	SXX	-.917603-01

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37	CEMIRIO	SXX	VXX	-.17724-01	VYY	-.910058-03	MYT	-.124827-01	MYT	-.326687-03
	NUDE 131		MXX	.162267-02	VYY	.157170-02	MYT	.741560-02	MYT	.358315-03
	NUDE 133		MXX	.715917-02	MYT	.741560-02	MYT	.198496-02	MYT	.358130-04
	NUDE 158		MXX	-.427156-02	MYT	-.198496-02	MYT			
	CEMIRIO	SXX	VXX	.388653-02	SYT	-.524347-02	SKY	-.124827-01		
	NUDE 131		MXX	-.215287-02	VYY	-.500619-02	MYT			
	NUDE 130		MXX	-.519571-02	MYT	-.286029-02	MYT	.246362-03		
	NUDE 133		MXX	-.294421-02	MYT	-.539046-02	MYT	.246362-03		
	NUDE 103		MXX	.524273-02	MYT	.301112-02	MYT	.973932-04		
	CEMIRIO	SXX	VXX	.179656-01	SYT	.492834-02	SKY	-.208355-02		
	NUDE 103		MXX	-.104376-02	VYY	.333012-02	MYT			
	NUDE 130		MXX	.494638-02	MYT	.434043-02	MYT	.110015-03		
	NUDE 130		MXX	.156981-02	MYT	.624887-03	MYT	-.415893-04		
	NUDE 139		MXX	-.528874-02	MYT	-.208071-02	MYT	.342128-04		
	CEMIRIO	SXX	VXX	.476833-02	SYT	.571926-03	SKY	-.415340-02		
	NUDE 130		MXX	.821628-03	VYY	.449025-02	MYT			
	NUDE 102		MXX	.500057-03	MYT	.205935-03	MYT	-.415892-04		
	NUDE 139		MXX	.898235-02	MYT	.823076-02	MYT	.314723-03		
	CEMIRIO	SXX	VXX	-.620423-02	SYT	-.289498-02	SKY	.136567-03		
	NUDE 137		MXX	.913655-02	SYT	-.929060-02	SKY	-.688523-02		
	NUDE 130		MXX	.278492-02	VYY	.253289-02	MYT			
	NUDE 129		MXX	.511230-03	MYT	.488713-03	MYT	.350111-04		
	NUDE 129		MXX	-.194255-02	MYT	.264925-02	MYT	-.830365-04		
	CEMIRIO	SXX	VXX	.508309-02	SYT	.128823-02	SKY	-.240127-04		
	NUDE 182		MXX	.201571-01	SYT	-.565345-02	SKY	-.107814-01		
	NUDE 129		MXX	.192194-01	VYY	.756584-03	MYT			
	NUDE 157		MXX	.112347-01	MYT	.116819-01	MYT	-.836753-03		
	CEMIRIO	SXX	VXX	-.107307-03	SYT	.259785-03	SKY	.350112-04		
	NUDE 128		MXX	-.793802-02	MYT	-.266930-02	MYT	-.400871-03		
	CEMIRIO	SXX	VXX	-.126259-01	SYT	-.244331-01	SKY	-.104845-01		
	NUDE 128		MXX	-.153752-01	VYY	.100960-02	MYT			
	NUDE 161		MXX	.201757-02	MYT	.116459-02	MYT	.483098-03		
	NUDE 156		MXX	.851946-02	MYT	.741683-02	MYT	-.224185-03		
	CEMIRIO	SXX	VXX	-.595039-02	SYT	-.295836-02	SKY	.129452-03		
	NUDE 128		MXX	-.106100-01	SYT	-.756284-02	SKY	-.159851-01		
	NUDE 127		MXX	.527151-02	VYY	-.620333-02	MYT			
	NUDE 127		MXX	-.37623-03	MYT	-.181584-02	MYT	.123631-03		
	NUDE 161		MXX	-.242427-02	MYT	-.522972-02	MYT	.123631-03		
	CEMIRIO	SXX	VXX	.590693-02	SYT	.390283-02	SKY	-.927041-03		
	NUDE 127		MXX	-.161612-02	SYT	-.821426-02	SKY	-.118006-01		
	CEMIRIO	SXX	VXX	.244475-01	VYY	.480597-02	MYT			

MODE 161	MAX	.203952-01	MY	.176207-01	MAX	.253143-03
MODE 127	MAX	.591706-02	MY	.282482-02	MAX	-.107196-02
MODE 155	MAX	-.118700-01	MY	-.608937-02	MAX	-.412160-03
CENIRNO10	SXX	-.237668-01	SVY	-.218755-01	SXX	-.733611-02
	VXX	-.140556-01	VY	.490057-03		
MODE 126	MAX	.202358-02	MY	.163453-02	MAX	-.534220-03
MODE 169	MAX	.786572-02	MY	.776165-02	MAX	.115440-03
MODE 154	MAX	-.341962-02	MY	-.131639-02	MAX	-.209440-03
CENIRNO10	SXX	-.187856-02	SVY	.531872-02	SXX	-.203737-01
	VXX	.955685-02	VY	-.791861-02		
MODE 160	MAX	.639442-02	MY	.639397-02	MAX	.351875-03
MODE 126	MAX	.531905-02	MY	.512165-02	MAX	-.975116-04
MODE 125	MAX	-.405948-02	MY	-.529720-02	MAX	.127182-03
CENIRNO10	SXX	-.349665-02	SVY	.478475-02	SXX	-.118042-02
	VXX	-.665629-03	VY	-.1114664-01		
MODE 125	MAX	-.501477-02	MY	-.524103-02	MAX	.351875-03
MODE 124	MAX	-.201188-02	MY	-.227648-02	MAX	.382474-03
MODE 180	MAX	.425941-02	MY	.563812-02	MAX	.553982-03
CENIRNO10	SXX	-.557834-02	SVY	-.111497-01	SXX	.289033-02
	VXX	.914688-02	VY	.600350-02		
MODE 160	MAX	.728088-02	MY	.741222-02	MAX	.480186-03
MODE 124	MAX	.137836-02	MY	.124808-02	MAX	.414026-03
MODE 153	MAX	-.277986-02	MY	-.159230-02	MAX	-.117841-02
CENIRNO10	SXX	-.164781-01	SVY	-.142382-01	SXX	.294332-02
	VXX	-.194988-01	VY	-.145472-01		
MODE 123	MAX	.194980-02	MY	.104816-02	MAX	.280579-03
MODE 179	MAX	.918287-02	MY	.589138-02	MAX	.280579-03
MODE 152	MAX	-.318069-02	MY	-.180419-02	MAX	-.197431-02
CENIRNO10	SXX	.869958-02	SVY	-.592957-02	SXX	.125810-02
	VXX	.209481-01	VY	.141160-02		
MODE 123	MAX	-.609790-03	MY	-.640453-03	MAX	.280578-03
MODE 122	MAX	-.815987-02	MY	-.785188-02	MAX	.106802-02
MODE 179	MAX	.796418-02	MY	.557218-02	MAX	.674302-03
CENIRNO10	SXX	.101770-01	SVY	-.145259-02	SXX	.320316-02
	VXX	.238526-01	VY	-.4445149-03		
MODE 101	MAX	.112793-02	MY	.117321-02	MAX	.296669-04
MODE 179	MAX	.109415-01	MY	.114799-01	MAX	.106802-02
MODE 122	MAX	-.688867-02	MY	-.360812-02	MAX	.947910-03
CENIRNO10	SXX	.692345-03	SVY	-.987261-03	SXX	.444470-02
	VXX	.355503-02	VY	.278806-02		
MODE 179	MAX	.302482-02	MY	.520259-02	MAX	.340115-03

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33	NUDE 101 NUDE 164	MAX MAX	-.251355-02 .137566-02	MY MY	-.248161-02 -.796730-03	MY MY	-.1602-2-05 .169217-03
	CENIROID VXX	SXX VXX	-.9555-02 -.157194-02	SV VY	-.448709-02 -.283485-02	SV VY	-.426209-02
	NUDE 172 NUDE 165 NUDE 164	MAX MAX MAX	.201946-02 -.188276-02 .954211-03	MY MY MY	.287506-02 -.950088-03 -.577987-03	MY MY MY	-.342579-03 .2406-2-05 -.169916-03
34	CENIROID VXX	SXX VXX	-.133572-01 -.296666-01	SV VY	.451977-04 .113120-01	SV VY	-.251416-02
	NUDE 165 NUDE 172 NUDE 140	MAX MAX MAX	.138448-02 .115789-01 -.430951-02	MY MY MY	.221814-02 .111707-01 -.565997-02	MY MY MY	-.319307-03 .100611-02 .130610-02
35	CENIROID VXX	SXX VXX	-.335075-01 .336831-03	SV VY	-.217508-01 -.207952-02	SV VY	.802709-02
	NUDE 141 NUDE 165 NUDE 140	MAX MAX MAX	-.118636-02 -.411293-03 -.287542-02	MY MY MY	-.966662-04 .350427-03 -.206796-02	MY MY MY	.719146-03 .602562-03 .331126-03
36	CENIROID VXX	SXX VXX	-.111646-01 .118628-01	SV VY	-.536605-02 -.929416-02	SV VY	-.461737-02
	NUDE 173 NUDE 165 NUDE 141	MAX MAX MAX	.813748-02 .209611-02 -.535076-02	MY MY MY	.854927-02 .116237-02 -.239935-02	MY MY MY	.341370-05 .341370-05 .705885-03
37	CENIROID VXX	SXX VXX	-.189012-01 -.163926-01	SV VY	-.791912-02 .127139-01	SV VY	.186976-02
	NUDE 142 NUDE 165 NUDE 173	MAX MAX MAX	-.415120-02 .302431-03 .642314-02	MY MY MY	-.443494-02 -.555103-03 .549393-02	MY MY MY	-.155336-03 .341368-03 -.759612-04
38	CENIROID VXX	SXX VXX	-.277925-01 -.379044-02	SV VY	-.118475-01 .242643-03	SV VY	-.294576-03
	NUDE 143 NUDE 165 NUDE 142	MAX MAX MAX	-.456472-02 -.262601-02 -.561747-03	MY MY MY	-.394550-02 -.148688-02 -.102230-04	MY MY MY	.144446-04 -.562807-03 -.220302-03
39	CENIROID VXX	SXX VXX	-.126376-01 .336612-02	SV VY	-.479832-02 -.108746-04	SV VY	.401400-02
	NUDE 165 NUDE 143 NUDE 166	MAX MAX MAX	-.534127-03 -.406643-03 .532995-03	MY MY MY	.503593-04 -.103703-03 .476343-03	MY MY MY	.196998-04 .365605-03 .993360-04
60	CENIROID VXX	SXX VXX	.419058-02 .156381-01	SV VY	-.724546-03 .756277-02	SV VY	.333765-02
	NUDE 165 NUDE 143	MAX MAX	.432696-03 -.672555-02	MY MY	-.229185-03 -.703445-02	MY MY	-.518767-04 .922024-04

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MODE	174	MXK	.777973-02	MYT	.350200-02	MXK	.201627-04
61	CENTROID	SXX VXX					
MODE 144							
MODE 146							
MODE 174							
62	CENTROID	SXX VXX					
MODE 144							
MODE 167							
MODE 166							
63	CENTROID	SXX VXX					
MODE 167							
MODE 144							
MODE 145							
64	CENTROID	SXX VXX					
MODE 167							
MODE 145							
65	CENTROID	SXX VXX					
MODE 120							
MODE 167							
MODE 175							
66	CENTROID	SXX VXX					
MODE 167							
MODE 120							
MODE 121							
67	CENTROID	SXX VXX					
MODE 120							
MODE 168							
MODE 121							
68	CENTROID	SXX VXX					
MODE 169							
MODE 120							
MODE 174							

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69	CENIRUID	SXX	SVY	.19670-01	SVY	.165216-02	SXX	-.751330-02
	NUDE 146	VXX	VYV	-.214395-01	VYV	.195834-01		
	NUDE 168			-.556230-02	MYV	-.559427-02	MYV	-.521816-03
	NUDE 176			.101876-03	MYV	-.281081-03	MYV	-.839071-03
				.611570-02	MYV	.500703-02	MYV	-.480444-03
70	CENIRUID	SXX	SVY	-.137239-02	SVY	-.284101-03	SXX	-.634117-03
	NUDE 147	VXX	VYV	.257887-02	VYV	-.664356-03		
	NUDE 168			-.134739-02	MYV	-.659908-03	MYV	-.290039-03
	NUDE 176			-.221714-02	MYV	-.968812-03	MYV	-.824418-03
				-.298166-02	MYV	-.135415-02	MYV	-.646160-03
71	CENIRUID	SXX	SVY	.136925-01	SVY	.300761-02	SXX	.149952-02
	NUDE 148	VXX	VYV	.166587-03	VYV	.117016-03		
	NUDE 168			.170842-03	MYV	.559958-03	MYV	-.574750-03
	NUDE 177			-.214933-03	MYV	.105824-03	MYV	.612911-04
				.515512-03	MYV	.105168-02	MYV	.567767-04
72	CENIRUID	SXX	SVY	.284937-01	SVY	.625039-02	SXX	.169822-02
	NUDE 149	VXX	VYV	.117825-01	VYV	.637202-02		
	NUDE 169			.855163-03	MYV	.707955-03	MYV	-.109142-03
	NUDE 177			-.468541-02	MYV	-.485057-02	MYV	-.123646-03
				.531849-02	MYV	.240560-02	MYV	-.116394-03
73	CENIRUID	SXX	SVY	.164411-01	SVY	.210804-02	SXX	-.572309-02
	NUDE 148	VXX	VYV	-.139869-01	VYV	.944573-02		
	NUDE 169			.346487-02	MYV	-.367503-02	MYV	-.279420-03
	NUDE 177			.103699-02	MYV	.774556-03	MYV	-.159142-03
				.563233-02	MYV	.294010-02	MYV	-.194281-03
74	CENIRUID	SXX	SVY	.125285-01	SVY	.495634-02	SXX	-.705562-03
	NUDE 148	VXX	VYV	-.316188-03	VYV	-.679513-04		
	NUDE 170			.503012-03	MYV	.745732-03	MYV	-.263491-03
	NUDE 169			.550794-03	MYV	.144748-02	MYV	-.172988-04
				.572495-03	MYV	.120533-02	MYV	-.107792-03
75	CENIRUID	SXX	SVY	.525932-03	SVY	.181505-02	SXX	.516208-04
	NUDE 170	VXX	VYV	-.974245-03	VYV	-.414357-03		
	NUDE 148			-.130157-02	MYV	.119737-03	MYV	.260371-03
	NUDE 169			-.128316-02	MYV	-.905378-03	MYV	-.203461-03
				-.180411-02	MYV	-.460013-03	MYV	.284551-04
167	CENIRUID	SXX	SVY	.181817-01	SVY	.764146-02	SXX	.136761-02
	NUDE 146	VXX	VYV	.115853-01	VYV	-.746052-02		
	NUDE 170			.583537-02	MYV	.633033-02	MYV	.150361-03
	NUDE 178			.618355-03	MYV	.753310-03	MYV	.260371-03
	NUDE 149			-.241232-02	MYV	.410478-03	MYV	.205361-03

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76	CENTROID	SXX	-.231910-03	SVY	-.227463-02	SXY	-.234471-02
	NUDE 178	VXX	-.526132-02	VYV	-.105059-02		
	NUDE 176	MXX	-.640517-02	MYV	-.537332-02	MXV	-.1675 2-03
	NUDE 186	MXX	-.04436-02	MYV	-.160876-03	MXV	-.340919-04
		MXX	-.480106-02	MYV	-.354450-02	MXV	-.245445-03
77	CENTROID	SXX	-.462333-02	SVY	-.428045-02	SXY	-.340894-02
	NUDE 150	VXX	-.638316-01	VYV	-.125373-01		
	NUDE 170	MXX	-.900753-02	MYV	-.935696-02	MXV	-.105917-02
	NUDE 178	MXX	-.927849-04	MYV	-.847541-03	MXV	-.523639-03
		MXX	-.441719-02	MYV	-.430344-02	MXV	-.239856-02
78	CENTROID	SXX	-.840434-02	SVY	-.130005-01	SXY	-.123343-02
	NUDE 176	VXX	-.381160-03	VYV	-.774697-03		
	NUDE 150	MXX	-.263571-03	MYV	-.141448-02	MXV	-.386906-03
	NUDE 171	MXX	-.655452-03	MYV	-.217766-02	MXV	-.496723-03
		MXX	-.212887-03	MYV	-.847990-03	MXV	-.298172-03
79	CENTROID	SXX	-.155314-01	SVY	-.167981-01	SXY	-.702664-02
	NUDE 171	VXX	-.542374-02	VYV	-.670859-02		
	NUDE 150	MXX	-.200594-02	MYV	-.229137-02	MXV	-.676253-03
	NUDE 151	MXX	-.624249-02	MYV	-.746838-02	MXV	-.539708-03
		MXX	-.176616-02	MYV	-.261809-03	MXV	-.311100-03
80	CENTROID	SXX	-.147661-01	SVY	-.350871-02	SXY	-.213046-02
	NUDE 119	VXX	-.629555-03	VYV	-.522465-03		
	NUDE 171	MXX	-.629642-03	MYV	-.159367-03	MXV	-.634746-06
	NUDE 151	MXX	-.336418-03	MYV	-.110651-02	MXV	-.634746-06
		MXX	-.446926-03	MYV	-.208679-04	MXV	-.400503-03
81	CENTROID	SXX	-.151774-01	SVY	-.683659-02	SXY	-.277606-02
	NUDE 171	VXX	-.447309-03	VYV	-.208722-03		
	NUDE 119	MXX	-.193804-03	MYV	-.892816-03	MXV	-.634753-06
	NUDE 163	MXX	-.597030-03	MYV	-.449582-04	MXV	-.634753-06
		MXX	-.381861-03	MYV	-.118219-03	MXV	-.289260-03
82	CENTROID	SXX	-.187039-01	SVY	-.179760-01	SXY	-.806243-02
	NUDE 162	VXX	-.850633-02	VYV	-.107151-01		
	NUDE 171	MXX	-.101975-01	MYV	-.113121-01	MXV	-.853903-03
	NUDE 163	MXX	-.270252-02	MYV	-.267750-02	MXV	-.102019-02
		MXX	-.227035-02	MYV	-.350499-03	MXV	-.755616-03
83	CENTROID	SXX	-.815232-02	SVY	-.122386-01	SXY	-.163734-02
	NUDE 122	VXX	-.499209-03	VYV	-.154009-02		
	NUDE 170	MXX	-.134858-02	MYV	-.346654-02	MXV	-.708253-03
	NUDE 171	MXX	-.476364-03	MYV	-.205931-02	MXV	-.386908-05
		MXX	-.151053-03	MYV	-.555846-03	MXV	-.431254-03

84	CENTROID	SXX	VXX	-.936079-02	SVY	.186946-01	SXX	.584543-02
	MODE 170	MXK	VXX	.784189-01	VXX	.152172-01	MXK	.215702-03
	MODE 162	MXK		.743471-03	MYT	.210849-02	MXK	-.282293-03
	MODE 185	MXK		.891084-02	MYT	.107082-01	MXK	.270714-02
		MXK		-.594461-02	MYT	-.512834-02	MXK	
85	CENTROID	SXX	VXX	.138373-02	SVY	-.190839-02	SXX	.664673-02
	MODE 170	MXK	VXX	-.582264-02	VXX	.104184-02	MXK	.334426-03
	MODE 165	MXK		-.178949-02	MYT	-.392567-03	MXK	.561481-03
	MODE 187	MXK		-.791663-02	MYT	-.656846-02	MYT	.915427-04
		MXK		.441303-02	MYT	.337608-02	MYT	
168	CENTROID	SXX	VXX	.205872-01	SVY	.754377-02	SXX	.783382-03
	MODE 170	MXK	VXX	.971797-02	VXX	.647912-02	MXK	-.139205-03
	MODE 187	MXK		.135203-02	MYT	.117898-02	MXK	.119138-03
	MODE 161	MXK		.575590-02	MYT	.644865-02	MYT	-.100834-04
		MXK		-.133305-02	MYT	.882790-03	MYT	
86	CENTROID	SXX	VXX	.124266-02	SVY	.116007-02	SXX	.107970-02
	MODE 160	MXK	VXX	.129122-02	VXX	-.595721-03	MXK	.170211-03
	MODE 170	MXK		-.189107-02	MYT	-.145744-02	MYT	.139205-03
	MODE 181	MXK		-.547939-03	MYT	.587037-03	MYT	.134134-04
		MXK		-.562284-03	MYT	.509993-04	MYT	
87	CENTROID	SXX	VXX	.123470-01	SVY	.450636-02	SXX	.218853-03
	MODE 170	MXK	VXX	-.328662-03	VXX	.789971-04	MXK	-.172588-04
	MODE 160	MXK		.579796-03	MYT	.145523-02	MYT	.261215-03
	MODE 169	MXK		.433570-03	MYT	.662245-03	MYT	.924221-04
		MXK		.942106-03	MYT	.126398-02	MYT	
88	CENTROID	SXX	VXX	.159852-01	SVY	.187070-02	SXX	.682630-02
	MODE 169	MXK	VXX	-.137489-01	VXX	-.920365-02	MXK	.104209-03
	MODE 160	MXK		.110621-02	MYT	.820724-03	MYT	.389018-03
	MODE 184	MXK		-.385505-02	MYT	-.347026-02	MYT	.206613-03
		MXK		.555127-02	MYT	.287771-02	MYT	
89	CENTROID	SXX	VXX	.273333-01	SVY	.561557-02	SXX	-.122933-02
	MODE 159	MXK	VXX	.116333-01	VXX	-.625711-02	MXK	.109630-03
	MODE 169	MXK		-.464658-02	MYT	-.481330-02	MYT	.104209-03
	MODE 184	MXK		.907782-03	MYT	.755244-03	MYT	.106920-03
		MXK		.522898-02	MYT	.227665-02	MYT	
90	CENTROID	SXX	VXX	.139324-01	SVY	.373667-02	SXX	-.293670-04
	MODE 159	MXK	VXX	.178966-03	VXX	-.137840-03	MXK	-.615964-04
	MODE 168	MXK		-.292177-03	MYT	-.108593-04	MYT	-.574750-03
	MODE 169	MXK		.144619-03	MYT	.486552-03	MYT	-.704176-04
		MXK		.515558-03	MYT	.105703-02	MYT	
91	CENTROID	SXX	VXX	-.387803-02	SVY	.688050-03	SXX	.203033-02

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92	NUDE 160	VXX	.193103-02	VYY	.349661-03	MYV	.782060-03
	NUDE 159	MYX	-.211473-02	VYY	-.947991-03	MYV	.260600-03
	NUDE 158	MYX	-.152740-02	VYY	-.907930-03	MYV	.593103-03
		MYX	-.126806-02	VYY	-.124035-02	MYV	
	CENTROID	SXX	.136269-01	STY	.113719-02	SXY	.949566-02
	NUDE 168	VXX	-.131956-01	VYY	-.177945-01		
	NUDE 158	MYX	-.131426-04	VYY	-.376562-03	MYV	.420598-03
	NUDE 163	MYX	-.213326-02	VYY	-.353902-02	MYV	.390313-03
		MYX	.348017-02	VYY	.251768-02	MYV	.409455-03
	CENTROID	SXX	.170963-01	STY	.228209-02	SXY	.123257-02
	NUDE 139	VXX	.396049-02	VYY	-.567346-04		
	NUDE 168	MYX	-.409658-02	VYY	-.301587-02	MYV	.110015-03
	NUDE 183	MYX	-.731784-03	VYY	-.613707-03	MYV	.420528-03
		MYX	.420690-02	VYY	.243114-02	MYV	.263306-03
	CENTROID	SXX	.453793-02	STY	-.283573-02	SXY	.239565-02
	NUDE 131	VXX	-.863427-03	VYY	.376149-03		
	NUDE 168	MYX	-.188750-02	VYY	-.147359-02	MYV	.231399-03
	NUDE 139	MYX	-.747175-03	VYY	-.911753-03	MYV	.331767-03
		MYX	.105187-02	VYY	.559381-03	MYV	-.145863-03
	CENTROID	SXX	.445869-02	STY	-.225425-02	SXY	.288736-02
	NUDE 110	VXX	-.104559-02	VYY	.163206-03		
	NUDE 167	MYX	.801810-03	VYY	.689747-03	MYV	-.176165-04
	NUDE 121	MYX	.127135-02	VYY	.139961-02	MYV	.505051-04
		MYX	-.104400-02	VYY	-.656342-03	MYV	.164433-04
	CENTROID	SXX	.576208-02	STY	.358326-02	SXY	-.729372-03
	NUDE 167	VXX	-.701055-02	VYY	-.520324-03		
	NUDE 139	MYX	-.319248-03	VYY	-.108390-02	MYV	-.449014-03
	NUDE 182	MYX	-.689403-02	VYY	-.661115-02	MYV	.314723-03
		MYX	.699096-02	VYY	.335709-02	MYV	-.671514-04
	CENTROID	SXX	.253371-01	STY	.100430-01	SXY	-.439034-02
	NUDE 157	VXX	.233446-01	VYY	-.140071-01		
	NUDE 167	MYX	-.933986-02	VYY	-.859327-02	MYV	-.836753-03
	NUDE 182	MYX	-.828235-03	VYY	-.987870-03	MYV	-.449024-03
		MYX	.862850-02	VYY	.403638-02	MYV	-.642888-03
	CENTROID	SXX	-.225476-01	STY	.120650-02	SXY	-.142807-02
	NUDE 156	VXX	-.699566-02	VYY	.937645-03		
	NUDE 167	MYX	-.627507-03	VYY	.191183-04	MYV	-.775914-04
	NUDE 157	MYX	-.99639-02	VYY	-.162449-02	MYV	-.105512-02
		MYX	-.589791-02	VYY	-.356921-02	MYV	-.832517-03
	CENTROID	SXX	-.661934-02	STY	-.167110-02	SXY	-.157431-02
		VXX	-.149133-03	VYY	.134714-03		

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100	CENIPIO	SXX	-.629582-02	SVY	-.525100-02	SXX	.312111-02
		VXX	-.194061-01	VTY	-.121894-01		
	NUDE 167	MXK	-.864937-04	MTY	.657258-03	MXV	-.292219-04
	NUDE 156	MXK	-.112229-03	MTY	.118541-03	MXV	.483356-03
	NUDE 166	MXK	.298948-03	MTY	.234880-03	MXV	.150893-03
	NUDE 168	MXK	-.168142-02	MTY	-.184721-02	MXV	.342309-03
	NUDE 156	MXK	-.896800-02	MTY	-.107265-01	MXV	-.224185-03
	NUDE 181	MXK	.594534-02	MTY	.288881-02	MXV	.590618-04
101	CENIPIO	SXX	.409900-03	SVY	.563803-03	SXX	-.169329-02
		VXX	.157725-02	VTY	-.371341-03		
	NUDE 155	MXK	-.865406-03	MTY	-.934480-03	MXV	.327849-04
	NUDE 166	MXK	.890278-03	MTY	.165420-03	MXV	.143464-03
	NUDE 156	MXK	.274470-02	MTY	.101492-02	MXV	-.546515-04
102	CENIPIO	SXX	-.126836-01	SVY	-.493785-02	SXX	-.446445-02
		VXX	.355779-03	VTY	-.278374-04		
	NUDE 155	MXK	-.882320-03	MTY	-.264404-03	MXV	-.267508-03
	NUDE 165	MXK	-.828596-03	MTY	-.145000-03	MXV	.196998-04
	NUDE 166	MXK	.540447-03	MTY	.460978-03	MXV	-.445369-04
103	CENIPIO	SXX	-.278994-01	SVY	-.113547-01	SXX	-.469868-03
		VXX	-.223298-02	VTY	.128554-04		
	NUDE 165	MXK	-.229595-02	MTY	-.130377-02	MXV	.494996-03
	NUDE 153	MXK	-.341837-02	MTY	-.302949-02	MXV	-.854625-04
	NUDE 154	MXK	-.802446-03	MTY	-.194121-03	MXV	.197868-03
104	CENIPIO	SXX	-.191376-01	SVY	-.784764-02	SXX	-.210033-02
		VXX	-.163067-01	VTY	-.127231-01		
	NUDE 165	MXK	.263155-03	MTY	-.595939-03	MXV	-.122469-04
	NUDE 154	JTX	-.814023-02	MTY	-.455357-02	MXV	.115440-03
	NUDE 180	MXK	.640610-02	MTY	.340705-02	MXV	.515766-04
105	CENIPIO	SXX	-.110209-01	SVY	-.516915-02	SXX	.453243-02
		VXX	.118296-01	VTY	.930103-02		
	NUDE 165	MXK	.201727-02	MTY	.109772-02	MXV	-.122468-04
	NUDE 180	MXK	.813116-02	MTY	.859012-02	MXV	-.122468-04
	NUDE 153	MXK	-.354410-02	MTY	-.235448-02	MXV	-.720142-03
106	CENIPIO	SXX	-.330869-01	SVY	-.213001-01	SXX	-.789762-01
		VXX	.314808-03	VTY	.201754-02		
	NUDE 165	MXK	-.448048-03	MTY	.304555-03	MXV	-.606447-03
	NUDE 153	MXK	-.119937-02	MTY	-.891977-04	MXV	-.75374-03
	NUDE 152	MXK	-.294404-02	MTY	-.203081-02	MXV	-.34153-03
107	CENIPIO	SXX	-.152214-01	SVY	.782719-03	SXX	.263296-02
		VXX	-.296825-01	VTY	-.114997-01		
	NUDE 174	MXK	.114731-01	MTY	.111599-01	MXV	-.10020-02

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124	CENIROID	SXX VXX	-637959-01 SYV .736052-03 VTY MXK -.542961-04 MXK -.714904-03 MXK .552110-03	-261551-01 SKY .602137-04 MYT -.418177-04 MYT -.706324-03 MYT .177868-03	.960201-02 MXK -.332343-03 MXK -.254419-03 MXK -.282857-03
125	CENIROID	SXX VXX	-111170-01 SYV .392696-03 VTY MXK -.230268-03 MXK .424557-03 MXK -.124452-02	-663485-02 SKY .160759-02 MYT .385984-03 MYT .385756-03 MYT -.127294-02	-.333503-01 MXK .823279-04 MXK .435289-03 MXK .259459-03
126	CENIROID	SXX VXX	-291832-01 SYV .193443-02 VTY MXK .256859-02 MXK -.675024-03 MXK .137577-03	-155207-01 SKY .446026-02 MYT .312204-02 MYT -.416221-04 MYT -.534628-03	-.198227-01 MXK .855608-03 MXK .733687-04 MXK .137270-03
127	CENIROID	SXX VXX	-226039-01 SYV .385645-02 VTY MXK -.216640-02 MXK .688331-03 MXK .136666-02	-133496-01 SKY .161949-02 MYT -.121560-02 MYT .170696-02 MYT .298700-03	.511396-01 MXK -.402030-03 MXK .853603-05 MXK -.941846-04
128	CENIROID	SXX VXX	-257758-02 SYV .488111-03 VTY MXK -.331109-03 MXK -.167145-02 MXK .569109-03	.132042+00 SKY .279218-02 MYT .657085-03 MYT -.663754-03 MYT .211893-02	.877691-01 MXK -.174665-03 MXK -.571523-04 MXK -.116638-03
129	CENIROID	SXX VXX	-228593-03 SYV .637306-05 VTY MXK .540407-02 MXK .536258-02 MXK .141123-02	-757016-02 SKY .272715-02 MYT .152330-02 MYT .253018-02 MYT -.853705-03	-.613702-02 MXK .801028-02 MXK .734577-02 MXK .767802-02
130	CENIROID	SXX VXX	-200468-01 SYV .279405-02 VTY MXK .718685-03 MXK .533744-04 MXK .479510-02	.603055-02 SKY .348610-02 MYT .968298-03 MYT -.251578-02 MYT .669556-03	.936820-02 MXK .539283-02 MXK .717906-02 MXK .641675-02
131	CENIROID	SXX VXX	-282995-01 SYV .106697-02 VTY MXK .441123-02 MXK .793910-03 MXK .587034-02	.330715-02 SKY .124027-02 MYT .110063-02 MYT -.174152-02 MYT .792073-03	-.150391-01 MXK .393323-02 MXK .539296-02 MXK .467852-02

132	CENTROID	SXX VXX	.476458-02 -112911-02	STY VTY	.590492-02 .302634-02	SXY MXY	.190913-01 .379415-02
	MODE 118	MAX	.737047-02	VTY	.137502-02	MXY	.141382-02
	MODE 119	MAX	.108781-01 .525908-02	VTY	.229083-03 -108352-03	MXY	.260399-02
133	CENTROID	SXX VXX	-.968065-03 .237463-03	STY VTY	.337580-02 .681108-04	SXY MXY	-.969978-03 .849262-03
	MODE 122	MAX	-.659736-03	VTY	.221458-03	MXY	-.125882-03
	MODE 123	MAX	.760575-03 .505270-03	VTY	.136359-02 .208624-02	MXY	-.586997-04
134	CENTROID	SXX VXX	.673112-02 -.837249-03	STY VTY	.520075-02 -220522-03	SXY MXY	-.138467-02 -.451007-03
	MODE 122	MAX	.411919-02	VTY	.404949-02	MXY	-.253986-04
	MODE 22	MAX	.297861-02 .156297-02	VTY	.378967-02 .100771-02	MXY	-.224846-03
135	CENTROID	SXX VXX	.716718-02 -.862433-02	STY VTY	.534465-02 .157726-02	SXY MXY	-.588120-02 -.915850-03
	MODE 122	MAX	-.178446-02	VTY	-.560700-03	MXY	-.451007-03
	MODE 22	MAX	.146701-02 .328977-02	VTY	.162819-02 .162595-02	MXY	-.586421-03
136	CENTROID	SXX VXX	-.563314-02 .500956-04	STY VTY	-.182603-01 -.754083-04	SXY MXY	-.259966-01 -.648089-03
	MODE 122	MAX	.130585-03	VTY	.789682-03	MXY	-.658432-03
	MODE 123	MAX	-.372083-03 .151595-03	VTY	.265117-03 .104211-02	MXY	-.663680-03
137	CENTROID	SXX VXX	-.990911-02 -.195664-03	STY VTY	-.184440-01 -.785917-04	SXY MXY	.160057-01 .887492-03
	MODE 125	MAX	-.526145-03	VTY	.705011-03	MXY	.699097-03
	MODE 124	MAX	.341597-03 .564972-03	VTY	.195312-02 .205136-02	MXY	.593495-03
138	CENTROID	SXX VXX	.162208-01 .164776-02	STY VTY	-.292664-02 .107029-02	SXY MXY	.648686-02 .329121-03
	MODE 125	MAX	.218773-02	VTY	.310288-02	MXY	.569165-03
	MODE 24	MAX	-.423253-03 .140931-02	VTY	.971052-03 .121914-02	MXY	.512199-03
139	CENTROID	SXX VXX	.217676-01 -.351426-02	STY VTY	-.109618-02 -.472631-02	SXY MXY	.178154-01 -.28078-04
	MODE 125	MAX	.100357-02	VTY	.934031-03	MXY	.828178-04
	MODE 25	MAX	.171799-02 -.922239-03	VTY	.613610-03 -.648550-03	MXY	-.103517-03

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151 XX	.122214+00 YY	.114481+00 ZZ	.306008+00 XY	.313426-01 XZ	-.709154+00 YZ	-.380327+00
150 XX	.366442+00 YY	-.304953+00 ZZ	-.780157+00 XY	.176886-02 XZ	-.574127+00 YZ	-.432040+00
206 XX	.131493-01 YY	-.126969-01 ZZ	.213821+00 XY	-.117229-01 XZ	.264883-01 YZ	.237833+00
53 XX	.649621-01 YY	.560396-02 ZZ	.905948-01 XY	.122093-01 XZ	.105718+00 YZ	.144951+00
153 XX	.380027-01 YY	.930000-01 ZZ	.134050+00 XY	.939044-02 XZ	.106106+00 YZ	.483137-01
152 XX	.104031+00 YY	.104953+00 ZZ	.283457+00 XY	.596060-02 XZ	.114709+00 YZ	.713659-01
25 XX	.244396-01 YY	.418271-01 ZZ	.221600-01 XY	.375386-01 XZ	.1167215+00 YZ	.947166-01
24 XX	.347902-01 YY	.572740-01 ZZ	.132062-01 XY	.399028-01 XZ	.140204+00 YZ	.222098-02
124 XX	.703933-01 YY	.693808-01 ZZ	.612945-01 XY	.133509-01 XZ	.474668-01 YZ	.138189+00
123 XX	.800384-01 YY	.694126-01 ZZ	.656458-01 XY	.992565-02 XZ	.108725-01 YZ	.154166+00
207 XX	.329693-02 YY	.230631-01 ZZ	.177726+00 XY	.192024-01 XZ	.137456-01 YZ	.409647-00
55 XX	.366719-01 YY	.609077-03 ZZ	.892131-01 XY	.291403-01 XZ	.153123-02 YZ	.135517+00
153 XX	.297918-01 YY	.595442-01 ZZ	.118397+00 XY	.854623-02 XZ	.935268-01 YZ	.284186-01
154 XX	.773247-01 YY	.849336-01 ZZ	.222572+00 XY	.644655-02 XZ	.888519-01 YZ	.208731+00
26 XX	.213388-01 YY	.429165-01 ZZ	.402541-01 XY	.124501-01 XZ	.541095-01 YZ	.435541-01
27 XX	.536296-01 YY	.503086-02 ZZ	.54343-02 XY	.311121-01 XZ	.476713-01 YZ	.136273+00
127 XX	.599623-01 YY	.447618-01 ZZ	.491711-01 XY	.681770-02 XZ	.675915-01 YZ	.231748-01
126 XX	.775361-01 YY	.6661086-01 ZZ	.804702-01 XY	.473802-02 XZ	.782592-01 YZ	.206286+00
208 XX	.298149-02 YY	.944018-01 ZZ	.173737+00 XY	.707942-02 XZ	.487404-02 YZ	.261844-01
57 XX	.181778-01 YY	.236584-01 ZZ	.135247+00 XY	.11781-01 XZ	.124985-01 YZ	.135163+00
157 XX	.549599-01 YY	.604599-01 ZZ	.160042+00 XY	.288495-02 XZ	.159278-01 YZ	.324349-02
156 XX	.620212-01 YY	.710357-01 ZZ	.207652+00 XY	.115627-01 XZ	.226693-01 YZ	.178060+00
28 XX	.211149-01 YY	.471545-01 ZZ	.494072-01 XY	.422255-02 XZ	.273599-01 YZ	.266556-01
29 XX	.133773-01 YY	.931900-01 ZZ	.418475-01 XY	.188476-01 XZ	.253803-01 YZ	.139528+00
129 XX	.311703-01 YY	.589674-01 ZZ	.496226-01 XY	.117880-03 XZ	.257589-01 YZ	.287826-02
128 XX	.372720-01 YY	.150353-01 ZZ	.560265-01 XY	.895898-02 XZ	.277544-01 YZ	.177519+00
209 XX	.530815-05 YY	.597221-01 ZZ	.187196+00 XY	.311092-01 XZ	.397214+00 YZ	.536041-01
59 XX	.737217-01 YY	.260994-02 ZZ	.173202-01 XY	.365762-01 XZ	.359420+00 YZ	.571862-01
159 XX	.143193-01 YY	.446463-02 ZZ	.493649+00 XY	.104699-02 XZ	.273112+00 YZ	.135040-01
158 XX	.135534+00 YY	.712971-01 ZZ	.240937+00 XY	.114052-01 XZ	.256329+00 YZ	.925731-01
31 XX	.437798-01 YY	.610994-01 ZZ	.571147-01 XY	.453198-01 XZ	.302114+00 YZ	.567035-01
32 XX	.191790-01 YY	.921242-02 ZZ	.245795-01 XY	.214368-01 XZ	.294368+00 YZ	.504403-01
132 XX	.100333-01 YY	.191318-01 ZZ	.239599-01 XY	.920207-03 XZ	.299436+00 YZ	.705811-02
131 XX	.271333-02 YY	.5269506-01 ZZ	.354300-01 XY	.113300-01 XZ	.301185+00 YZ	.916719-01
210 XX	.111493-02 YY	.250400-01 ZZ	.131321+00 XY	.433676-01 XZ	.440293+00 YZ	.639764-01
61 XX	.671611-01 YY	.556713-03 ZZ	.146697-01 XY	.529168-01 XZ	.463016+00 YZ	.109140-01
161 XX	.330271-02 YY	.141606-01 ZZ	.134685-02 XY	.496951-02 XZ	.392157+00 YZ	.722948-01
160 XX	.891150-01 YY	.716779-01 ZZ	.195764+00 XY	.102028-01 XZ	.375442+00 YZ	.723634-02
53 XX	.59					

